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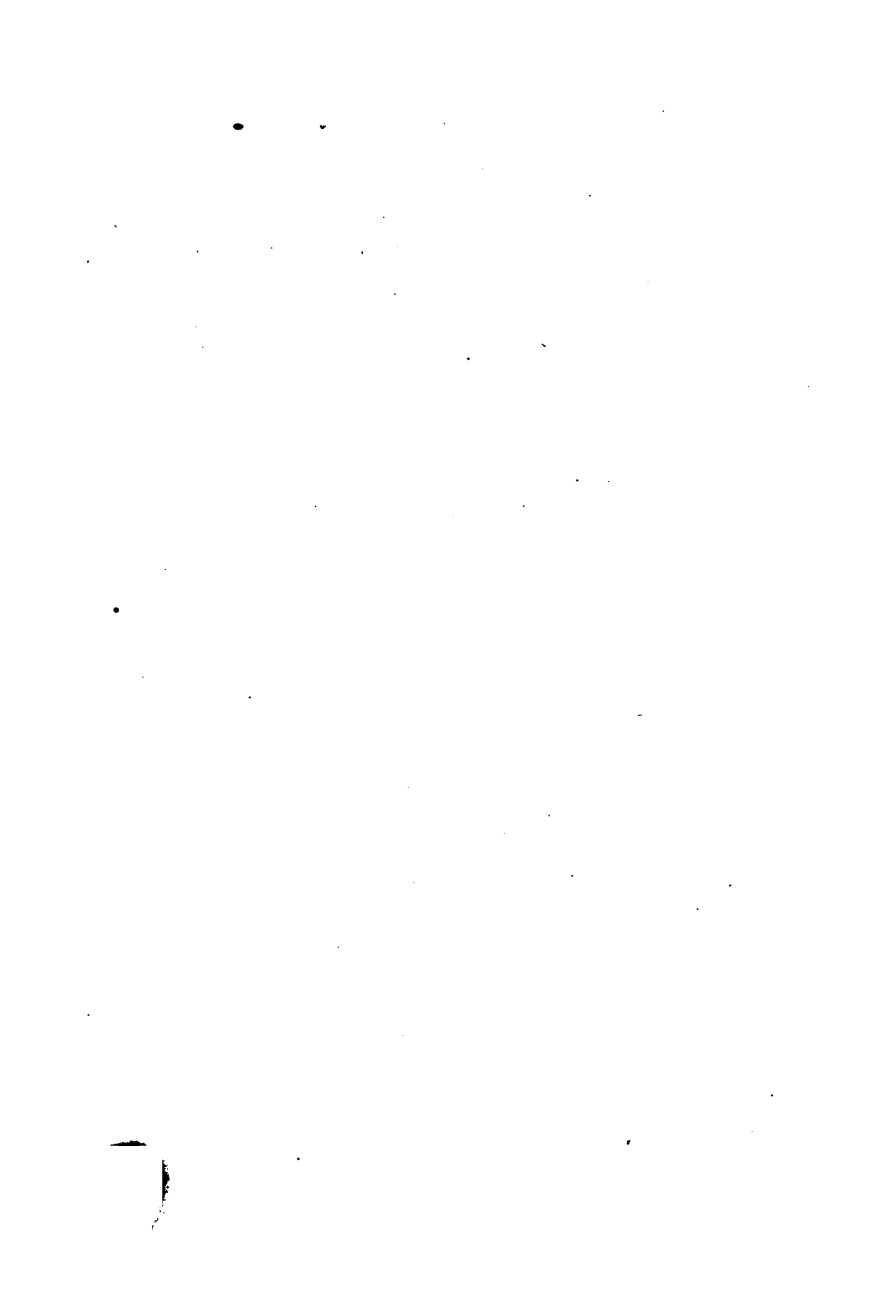
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THE

CHILD'S CATECHISM

OF

COMMON THINGS

BY

JOHN D. CHAMPLIN, JR.

*Late Associate Editor of the American Cyclopædia, and Author of the
Young Folks' Cyclopædia of Common Things*



NEW YORK

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1887.

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PREFACE.

THIS little book is arranged on a somewhat novel plan. Its titles, instead of being put in alphabetical form, are classified into the three general divisions of the Mineral, Vegetable, and Animal Kingdoms; and the subjects belonging to these several divisions are treated in course as suggested by one another—thus, common salt naturally suggests other salts, such as nitre, alum, etc., and nitre leads to gunpowder and sulphur. The topics, too, are not treated cyclopædically, but are arranged in the form of questions and answers; and while a very full index makes possible its use as a book of reference, it is primarily intended for a school class-book, by the study of which a child may acquire a knowledge of all the common things which come within the range of his daily life. The questions are not in all cases mere titles to the subjects, as is the usual form in books of a similar arrangement, but are often suggestive, and sometimes convey nearly as much information as the answer. By following this plan the writer has been en-

abled to compress a great deal of matter into a small space, and to make the work much more comprehensive than it would otherwise have been.

The publishers confidently offer this little work for the consideration of those interested in educational matters, in the firm belief that its use as a text-book in schools will enlarge the scope of children's ideas by making them acquainted with many subjects of which ordinary school-books do not treat; and that its introduction in the family circle will prove of benefit to both parents and children—to the former by saving them the trouble of answering numberless questions, and to the latter by giving them at once amusement and instruction.

NEW YORK, Nov. 1, 1879.

THE
CHILD'S CATECHISM
OF
COMMON THINGS.

May not everything in the world be divided into three great classes or divisions ?

Yes ; into three divisions called Kingdoms : the Mineral Kingdom, the Vegetable Kingdom, and the Animal Kingdom.

Why are they called Kingdoms ?

Because each division has some peculiarity or mark which rules everything in it.

What is the ruling peculiarity of the Mineral Kingdom ?

Want of life ; nothing in the Mineral Kingdom has any life in it, and everything which has no life belongs to it.

Can you name some of the principal things in the Mineral Kingdom ?

Rocks, metals, earths, water, and air.

What is the ruling peculiarity of the Vegetable Kingdom ?

Vegetable life, or that kind of life which has no feelings, and which has not the power of moving from place to place.

Do not all plants belong in this division ?

Yes ; every plant that grows ; for every plant has life in it, but none can feel or move.

What is the ruling peculiarity of the *Animal Kingdom* ?

Animal life, or that kind of life which has the power of feeling, and of moving from place to place.

Do not all animals belong in this division ?

Yes ; every animal which lives on the land, in the water, or in the air.

Can you now repeat, in a few words, the difference between minerals, plants, and animals ?

Minerals have no life.

Plants have life, but can neither feel nor move from place to place.

Animals have life, and can feel and move.

THE MINERAL KINGDOM.

Is not salt one of the most useful of all minerals ?

Yes ; salt is needed for our health : men and animals would suffer without it.

What are its principal uses ?

It is largely used for food, for medicine, for preserving meats and fish, and for making soda, bleaching-powder, and other things.

Is it not very scarce in some countries ?

Mungo Park, the traveller, says that in the middle parts of Africa it is so scarce that to say a man eats salt with his food is the same as saying he is a rich man.

What does "to sit above the salt" mean ?

In old times, in England, when it was the custom in noble and rich families for the servants to take their meals in the great hall with their masters, a large salt-cellar was put in the middle of the table, and the servants and poor guests were seated below this. It was therefore thought a mark of honor to be seated above the salt, or at the end of the table where the master sat.

Is it not in some countries a mark of friendship to give salt to a person ?

Yes; in Russia bread and salt are offered to guests, and to eat salt with an Arab is to make him a friend.

Where is salt mostly found ?

In sea-water, in salt lakes and springs, and in mines.

What makes sea-water salt ?

All streams and rivers which flow into the sea carry in their waters some salt washed out of earth and rocks, and in the course of long ages enough salt has thus been gathered in the ocean to make its waters very salt.

How is salt got from sea-water ?

By putting the sea-water into large shallow vats or pans in the sunlight. The heat of the sun dries up the water and leaves the salt in the bottom of the pans.

How is salt got from salt lakes and springs ?

By boiling the water in kettles or shallow troughs; the water passes off as steam and leaves the salt.

What kind of salt is dug from mines ?

Rock-salt; so called because it is solid like rock, and may be cut out in great blocks.

Are there not some wonderful rock-salt mines in the world ?

There are several large ones in England and in Germany, but the most noted ones are

those of Wieliczka, near Cracow, in Poland, in which the streets and galleries are more than five hundred miles long. In it are many large rooms and chambers cut out of the solid salt; and one of them is fitted up as a chapel, in which the altar and pulpit, the columns which hold up the roof, and the statues are all of salt.

What is saltpetre?

Another kind of salt, also called nitre, found pure on the ground in some parts of the earth, especially in Arabia, Persia, and India, and on the damp walls of limestone caves. The word saltpetre means salt of rock.

Is it not of great importance in the arts?

Yes; and also in medicine and in chemistry. Nitric acid, commonly called *aqua fortis*, is made from it.

What is nitric acid?

A very sour, biting liquid, which will burn and turn yellow most animal and vegetable substances. On this account it was named in old times *aqua fortis*, which is the Latin for strong water.

What are its uses?

It is used for separating metals from their ores, for dissolving metals for different purposes, for engraving on metals, and for many other things.

What other very important use has nitre or saltpetre ?

It is one of the principal things in gunpowder.

What other things are mixed with it in making gunpowder ?

Sulphur and charcoal.

Is not sulphur the same as brimstone ?

Yes; sulphur is the Latin name, and brimstone is English.

Why is it called brimstone ?

Brimstone means burn-stone; it is so called because it is a hard substance like stone which burns easily, making a choking smoke.

What are flowers of sulphur ?

Sulphur made into a kind of yellow flour.

How is gunpowder made ?

By mixing together saltpetre, sulphur, and charcoal; nearly three fourths of it is saltpetre, and the other fourth is made up of about equal parts of sulphur and charcoal.

How long has gunpowder been known ?

Between five and six hundred years in Europe; but the Chinese and the people of India are supposed to have used it as early as the time of Christ.

Has not gunpowder other uses than that of firing in guns and cannon ?

It is also used in blasting rocks, in mining, and in making fireworks.

What other important thing is made from sulphur?

Sulphuric acid, commonly called oil of vitriol.

Why is it called oil of vitriol?

Because it is a kind of oily liquid, and was first made from green vitriol, or copperas.

Is it not a very biting liquid and dangerous to touch?

Yes; it will burn most animal and vegetable substances; but it is one of the most useful things in the world, and many of the arts could not be carried on without it.

What are some of its uses?

It is used in making phosphorus, alum, and soda; in bleaching, dyeing, and calico printing; in refining, or purifying, petroleum; in the making of fertilizers, or manures for enriching land; and in many other ways.

What is phosphorus?

A wax-like substance which, when pure, takes fire very easily, either by warmth or by rubbing. For this reason it is used to make lucifer matches.

Are not the ends of matches first dipped into sulphur?

Yes; but sulphur will not take fire by rubbing; it is only meant to burn long enough to kindle the wood of the match. After the sulphur is put on, the end of the match is dipped into a paste made of phosphorus and saltpetre or some other thing, and it is this paste which takes fire when rubbed and

sets on fire the sulphur, which lights the match.

Cannot phosphorus be seen in the dark ?

Yes ; at the common heat of the air it gives off a white smoke, which makes it shine in the dark.

Where do we get phosphorus ?

Mostly from the bones of animals. Growing plants take up phosphorus from the earth, and when animals eat the plants it goes into their bones, and from them chemists make it.

What is alum ?

A whitish kind of salt, much used by dyers to fix colors, by tanners in making leather and in coloring morocco, by sugar-makers for whitening sugar, by bakers to whiten bread made from poor flour, and by candle-makers for hardening candles. It is also used in medicine.

Is not alum sometimes found pure ?

Yes ; but it is more commonly made out of alum earth. The earth is first roasted with fire in heaps, and then mixed with hot water in large pans. The liquid is afterward drawn off and boiled until the water passes away in steam, leaving only the solid part.

What is borax ?

A colorless salt, with a greasy feel, and a smell like soap. When heated it melts into glass, and is therefore much used in making

enamels, false gems, and paints and glazes for pottery. It is also used in washing clothes, and for cleaning the hair.

Where is it found ?

In India, China, Persia, and Ceylon ; and in the United States in California and Nevada.

What is soda ?

A whitish substance used in making glass and soap, and in washing, both in cloth factories and in dwellings.

Is it not also used in cooking ?

Yes ; it is put into bread to make it light ; but cooking soda is not so strong as washing soda.

Is not soda-water also made from soda ?

It was at first made with it, and from this it got its name, but soda-water has now no soda in it ; it is only water filled with a kind of gas called carbonic acid, and flavored with syrups.

Where does soda come from ?

It is now made in great quantities out of common salt, but in former times a coarse kind, called barilla, was made from the ashes of a plant which grows on the sea-coasts of Spain and France, and a still poorer kind, called kelp, from a sea-weed of the same name.

What is potash ?

A reddish brown substance made out of wood ashes. Great quantities of wood are burned in forests in the United States, Canada, Russia, and Germany to get ashes for making it.

Why is it called potash ?

Because it is made in pots. The ashes are soaked in water until all the potash is got out of them, and the yellow liquid thus made, which is called lye, is then boiled down in pots until the water is driven off in steam and only the solid potash is left.

Is not potash very valuable ?

Yes ; it is largely used in making glass, porcelain, earthenware, fireworks, and soap ; also in washing, bleaching, and dyeing.

What is pearlash ?

Potash made pure by heating it in a furnace, which makes it pearly white.

Is not saleratus also made from potash ?

Yes ; it is rightly a very pure kind of potash, but the saleratus now used is mostly cooking soda.

What is magnesia ?

A soft white powder, without taste or smell ; it will not melt in any common fire, and is therefore much used for making small crucibles, or pots used by chemists for heating things in.

Is not the salt called Epsom salts made from magnesia?

Yes; by mixing magnesia with sulphuric acid. This salt is so called because it is found in the water of a mineral spring at Epsom, England. It has a bitter, unpleasant taste, and is used as a medicine.

What is lime?

A hard white substance, commonly called quicklime, made by burning limestone in a furnace called a lime-kiln. It is also made sometimes by burning marble, and oyster and other shells.

Can lime be melted?

No; it will not melt, and it is therefore used in making crucibles, or pots for melting metals in. It is also much used in smelting metals; that is, in getting them out of their ores by melting.

What is slaked lime?

When quicklime is wet with water, it swells up, gives off much heat and steam, and changes into a soft white powder called slaked lime. So much heat is made by the union of the lime and the water that buildings and ships in which quicklime is stored are sometimes set on fire by its getting wet.

Are not mortar and plaster made with slaked lime?

Yes; by mixing it with sand and making it into a smooth paste. A little cow-hair is commonly put in to help hold it together

when it is plastered on thickly. Slaked lime is also used to purify coal gas, to take the hair from skins in tanning, in making paper pulp, and as a manure for land.

What is chloride of lime ?

A dry white powder, with a sourish smell, made by the union of slaked lime with a strong gas called chlorine.

Does it not destroy bad smells ?

Yes ; and it is therefore much used for purifying drains, sewers, and other bad-smelling places.

Is it not also called bleaching-powder ?

Yes ; and its chief use is for bleaching cotton and linen cloths, great quantities of it being made for that purpose.

What is limestone ?

It is the common name for all rocks made up largely of lime, and from which lime may be made by burning.

Is not marble a kind of limestone ?

Yes ; but it is harder and firmer than common limestone, and can be polished very smooth.

Is all marble equally hard and fine-grained ?

No ; some is coarse-grained and fit only for building, and some is fine-grained enough for making statues and the most delicate ornaments. Some kinds, too, are very lasting,

while others are soft and easily crumbled to pieces by the weather.

Is not marble found of all colors ?

Yes ; and some kinds are beautifully marked with stripes, spots, and shades of different tints.

What is statuary marble ?

White marble fine enough to be carved into statues. The ancient Greek statues were made mostly of Parian marble, got in the island of Paros, and Pentelic marble, taken from Mount Pentelicus, near Athens. Most of the marble now used for making statues is brought from Carrara, in Italy, where the quarries have been worked since the time of Julius Cæsar.

Are not statues now made of Parian marble ?

No ; the Parian quarries have not been worked in a long time. The little figures or statuettes called Parian marble in the stores are not marble, but are made of a kind of clay, and baked in an oven like porcelain.

What is gypsum ?

A soft chalky kind of stone, commonly white, but sometimes of other colors on account of other things mixed with it. When baked in ovens and ground to powder it makes the white plaster called plaster of Paris, so much used in making plaster figures, cornices, and ceilings.

Are there not several qualities of gypsum ?

Yes; a fine-grained kind is called gypsum alabaster; another kind, so clear that one can see through it, is called selenite; and still another kind, called satin spar, is used for making necklaces and inlaid work.

Is there not another kind of alabaster ?

Yes; calcareous (limey) alabaster, sometimes called oriental alabaster, used for carving large things, such as mantelpieces and columns. Gypsum alabaster, which is the more common kind, is usually made into vases, boxes, and small ornaments.

Where did alabaster get its name from ?

From the town of Alabastron, in ancient Egypt, where it was largely quarried and carved.

Is not chalk also a soft kind of limestone ?

Yes; and it is made up almost entirely of the shells of little sea animals, which in the course of long ages have been packed together so closely, and in such large quantities, that in some parts of the world there are great hills of chalk twenty times as high as a house.

What are the uses of chalk ?

When burned it makes good quicklime and good manure for land. Some chalk is hard enough for building-stone. Chalk is also given as a medicine, and is used for marking on blackboards.

Is not whiting, used for polishing metals and glass, made of chalk?

Yes; by grinding it fine and purifying it by washing. Putty, used by glaziers to fasten glass in window-frames, is made of whiting mixed with linseed oil.

What is black chalk?

A kind of clay found in or near coal-mines; it gets its color from carbon, which is the principal thing in coal.

Is not red chalk also a kind of clay?

Yes; clay colored with iron-rust. The coarse kinds are used by carpenters for marking on wood, and the fine kinds by artists.

What is French chalk?

A kind of soapstone used by tailors for marking on cloth, and by glaziers to mark on glass.

What is soapstone?

A soft mineral of a pearly gray color, but sometimes greenish, and having a soapy feel.

Is it not very useful?

Yes; stoves, ovens, and hearths are made of it, and it is used for slate-pencils and crayons. The powder used by shoemakers to dust the inside of boots and shoes, to make them go on easily, is ground soapstone.

What is meerschaum?

A mineral something like soapstone, but which looks more like chalk.

What does its name mean?

Sea-foam, it being made up of the German words *meer*, the sea, and *schaum*, foam.

Is it not quite valuable?

Yes; it is much prized for making meer-schaum pipes and cigar-holders. These are largely made in Vienna and Pesth, and some are made in New York and other cities.

Where does meerschaum mostly come from?

From Konieh, in Asia Minor, where it is dug out of the earth.

Is not black-lead the same as plumbago?

Yes; but its right name is graphite. It is wrongly called black-lead, for there is no lead in it.

Are not lead-pencils made of it?

Yes; but they are also wrongly named.

What, then, is black-lead?

It is a grayish-black, soft, and greasy mineral, found commonly in lumps between layers of slate. It is mostly carbon, of which coal is made, but is usually mixed with some clay, lime, and iron.

Does it melt easily?

No; it is very hard to melt, on which account it is mixed with clay to make crucibles, or melting-pots, which have to stand great heat.

Is not stove-blackening made of it?

Yes; and it is also used to smear the parts

of machines where there is much rubbing, to keep them from wearing.

Where is black-lead mostly found ?

There are mines of it in England, Germany, Austria, Siberia, Ceylon, and in the United States. The best in the world is dug at Ticonderoga, in the State of New York, it being almost pure carbon.

How are lead-pencils made ?

The black-lead is ground to powder, and washed with water until it is clean. It is then mixed with a kind of tough clay brought from Germany, and the two are ground together in water into a paste, from which the leads are made.

What is the clay put in for ?

The clay makes the difference between soft and hard pencils. The black-lead is too soft to use alone, and a little clay has to be put into the softest pencils, while in hard pencils the leads are made of half clay and half black-lead.

Are not the leads first made in one long piece ?

Yes; the paste is put into an iron barrel, in the bottom of which is a hole of the size and shape of the lead to be made. When pressed down hard, the paste is slowly forced through this hole and comes out in a long piece which coils up beneath like a coil of wire. This is

cut up into pieces, straightened, and hardened by baking, and put into the wood cases.

If black-lead and coal are made of the same thing, carbon, why cannot lead-pencils be made out of coal as well as out of black-lead ?

Because coal is not so pure carbon as black-lead, but has some bitumen mixed with it.

Is not bitumen a kind of pitch or resin ?

Yes ; but it is not got from trees, like common resin and pitch. It is found in the earth or in rocks, and sometimes bubbles up from springs like oil. There is much of it in the Dead Sea in Palestine ; and in the island of Trinidad, in the West Indies, is a large lake of it, which boils up in the middle, but is hard enough to walk upon near the edges.

What is the hard kind commonly called ?

Asphalt, or asphaltum. It is used, mixed with gravel, for making walks and roads, and for covering roofs.

Did not the ancient Egyptians embalm or preserve dead bodies with bitumen ?

Yes ; and this is what makes mummies so black and hard.

What is Coal made from ?

From vegetable matter turned into carbon and mixed with bitumen.

Where did the Vegetable Matter come from ?

In the early ages of the world, much of the earth was covered with dense forests of plants,

which died, one after another, until thick beds of vegetable matter were made where they had stood. In time some of these were sunk under water, where the vegetable matter partly rotted and became packed so closely that it turned into peat.

Is this the kind of peat used for burning in fires ?

Yes; and it is made into charcoal, which is better than wood charcoal for smelting iron; that is, for melting it out of its ores. Good gas can also be made of it, and other useful things, such as oil and tar.

Does not peat have to be dried before it is fit for fuel ?

Yes; this is commonly done in the sun, but sometimes it is ground into a paste and moulded into blocks, which are dried in ovens.

Did not some of these great peat-beds meet with other changes ?

Yes; some of them sunk lower into the earth, where, by great heat and pressure, the vegetable matter became packed more closely and turned into a kind of brown coal called lignite.

What further change took place ?

This brown coal in time turned into real coal, most of the vegetable matter having become carbon.

Where, then, did the bitumen come from ?

All trees and plants have in them some oily or gummy matter, which is turned into a kind of tar by decay, and in time becomes bitumen. This, mixed with the carbon, made coal.

Are not different kinds of coal made by the different quantities of bitumen in them ?

Yes; anthracite coal, which is the hardest kind, has in it the least bitumen; bituminous coal has in it much more than anthracite; and cannel coal has in it the most of all.

Is not anthracite coal the kind usually burned in grates and stoves ?

Yes; in the northern United States; but in the West and in Europe more bituminous coal is burned, because it is more plentiful there than anthracite.

Is not gas made out of bituminous coal ?

Yes; by heating it red-hot in close ovens called retorts, when it gives off steam, gas, tar, and other things. The tar runs off into cisterns, and the gas goes into holders made for it.

Is not some part of the coal left in the retorts ?

Yes; a part of the carbon is left, and this is what is commonly called coke.

What is coal-tar good for ?

Many valuable things are got from it, among which are naphtha, used in making varnishes, and for melting India rubber in; car-

bolic acid, used to prevent the spread of disease, to keep wood from decaying, and for making carbolic soap; and the beautiful colors called aniline colors, used in dyeing.

Is not cannel coal also used for fuel?

Yes; and it blazes up very brightly, like the flame of a candle.

What other uses has it?

It is so hard and has so fine a grain that it can be turned in a lathe and made into ornamental articles, which look like jet when polished.

Is not jet a kind of coal?

Yes; but harder and smoother than that used for burning. Much is found near Whitby, in England, where it is made into necklaces, earrings, brooches, bracelets, and other ornaments.

Is not petroleum, or rock oil, which is got out of the earth, made from coal?

Some of it is made from bituminous coal which has met with great heat deep down in the earth, but it is now mostly thought that the greater part of it comes from the decay of sea plants and animals.

How do we get it?

In some places it rises to the surface of the ground and flows in springs, but it is commonly got by sinking deep holes, called wells, into the earth.

Does it not rise up in these wells and flow over the top ?

Sometimes it does, forced up by water, or by a kind of gas which comes out of the earth with it, but in many of the wells the oil has to be pumped out.

What does the oil look like ?

As it comes from the wells it is a thick oily liquid of a yellowish or brownish green color, and it has to be purified before it is fit for use. This is done in places called refineries, where it is divided into the different things of which it is made up.

What are the principal things got from it ?

Oil for lamps, commonly called kerosene-oil; naphtha and benzine, used in making paints and varnishes, cleaning clothes and kid gloves, and other things; oil for greasing machinery; and paraffine, for making candles.

Is not the gas which comes from the earth with petroleum used for burning ?

Yes; several towns in the oil regions in Pennsylvania and New York are lighted and heated with it, and an iron-mill near Pittsburgh burns nothing but this gas, which is brought nearly nineteen miles in iron pipes. At night, when the gas is not needed, it is set on fire, and it blazes up as high as a four-story house, making a beautiful sight, which can be *seen for miles around.*

What is amber?

A hard, yellow, resinous substance, supposed to be the hardened gum of a kind of pine-tree which does not grow now.

Are not pieces of the bark of this tree often found in it?

Yes; as well as many insects of kinds which do not live now. Such pieces are valued more than plain ones.

What is amber used for?

For making ornaments, such as beads, necklaces, earrings, etc., the mouth-pieces of pipes and cigar-holders, and for burning for perfume. A good deal is sent to Mecca, where the Mohammedans burn it for incense in their worship.

Where is amber found?

In many parts of the world—on the coasts of the Adriatic Sea and of Sicily, in Siberia and Greenland, and in several places in the United States; but most of that sold comes from the Prussian coast of the Baltic Sea.

Is it picked up on the coast?

Some of it is, and some is dug out of the ground, but most is got out of the sea by dredging-machines, which scoop up the mud from the bottom, and by men who go down wearing diving armor, a dress which permits them to stay under water a long time.

Is not the amber found mostly in small pieces?

Yes; from the size of a grain of wheat up to that of a hen's egg.

What is clay ?

A kind of earth, usually found packed closely in solid beds. It is made of the fine dust of rocks which have been ground up by being rolled over each other in brooks and rivers.

Are there not many kinds of clay ?

Yes; among them are brick-clay, used for making bricks, drain-tiles, and other coarse pottery; potters' clay, used for making coarse earthenware, and by sculptors for making models for statues; pipe-clay, a purer kind of potters' clay, from which clay pipes are made; fire-clay, used for making fire-bricks and the linings of stoves; and kaolin, or china clay, from which porcelain is made.

How are bricks made ?

The clay is ground up in a mill into a kind of putty, which is moulded in little boxes into the form of bricks. These are first dried in the sun and then piled up loosely in great stacks, called kilns, with holes under them to build fires in, and baked for several days.

Is the clay from which bricks are made red ?

No; the clay is yellowish; but most brick-clay has some iron in it which is rusted by the fire in baking, and this makes the bricks red.

Are not some bricks yellow after baking?

Yes; when the clay has no iron in it. Bricks made of Milwaukee clay are cream-color.

What are fire-bricks made of?

Of kinds of clay which will not melt in fire, mixed sometimes with ground stones.

What are drain-tiles?

Pipes of baked clay, made in short pieces which can be fitted together to make drains.

Does not potters' clay turn red when baked?

Yes; it also has some iron in it. Common red flower-pots are made of it. Pipe-clay has no iron in it, and is white when baked.

Of what are the finer kinds of pottery made?

Of clay mixed with different things, such as sand, ground stone, chalk, alum, and soda. All the things are mixed together into a paste and moulded into plates, cups and saucers, and other dishes, which are then baked in very hot ovens.

What is the color of the earthenware thus made?

Cream-color or gray; but after being baked each piece is dipped into a liquid called glaze and baked again.

Does not the glaze make dishes white?

Yes; it covers them with a white glassy surface like that on all table-ware. If it were not for the glaze, earthenware dishes would

leak ; the glaze melts and fills up all the little pores or holes in the clay.

What is earthenware called before it is glazed ?

Biscuit.

Is not earthenware often painted and beautifully decorated ?

Yes ; such earthenware is commonly called majolica, from Majorca, an island in the Mediterranean, where the Arabs formerly made much fine pottery.

What is Delft ware ?

A kind of earthenware named from Delft, in Holland, where it was first made.

Is not terra cotta, from which many busts and little statues are made, also earthenware ?

Yes ; but it is not usually glazed.

What is stoneware, from which stone jars and jugs are made ?

It is a close-grained kind of pottery, which differs from earthenware in being baked so hard that its clay is melted together so that it cannot leak.

Is not porcelain the same as china-ware ?

Yes ; it was called china because first brought from China, where very fine ware has been made for many hundred years.

Who first named it porcelain ?

It was named porcelain by the Portuguese, some say because its surface looks like a kind of pearly shell called the porcellana shell.

Is not porcelain also made of clay?

Yes; but of a finer kind of clay than earthenware. Porcelain clay, which is called kaolin, from the name of the hill in China where it is dug, is now found in many parts of Europe and the United States. It is white, and is softer and more crumbly than common clay. When washed with water it looks like fine white flour.

Does not porcelain have to be very carefully made?

Yes; the kaolin is mixed with a powdered stone called feldspar, and other things, and made into a fine paste, out of which the pieces of porcelain are moulded. Some of the pieces are very thin, and only the best workmen can make them. Porcelain has to be baked, too, with less heat and more carefully than earthenware.

Is it not glazed like earthenware?

Yes; but the glaze is made in a different way, and it is baked so hot that it makes a glassy surface so thin and clear that light will shine through it.

How are the pictures and other decorations made on porcelain?

They are painted with colors made of different colored glass ground up fine and mixed with oil of turpentine. The porcelain is then heated until the glass colors are melted just enough to stick tight to the surface.

Are not very beautiful and costly painted vases made at Sevrès, in France, and at Dresden, in Germany ?

Yes; but fine ones are also made in Vienna and Berlin, and in several places in England. Splendid decorated porcelain is also brought from China and Japan, and a little is made in this country, but mostly table-ware.

Is there not a large tower made of porcelain at Nan-king, in China ?

There was such a tower, built more than four hundred years ago, but it was destroyed by the Chinese rebels in 1853. It was nine stories high, and was covered with beautiful porcelain plates. Each story had a gallery around it, and above it a cornice, from which were hung little bells that rang when the wind blew.

Of what is glass made ?

Of sand mixed with soda or potash, lime, and other common things. These are ground fine and mixed together into a kind of coarse yellow flour called frit, which is then melted in large crucibles or pots set into a furnace.

Are not the furnaces made of fire-clay bricks ?

Yes; for they have to bear a very great heat. When the fire is once lighted in a glass furnace it is never let go out until the furnace is so burned that a new one has to be built, which is every year or two.

Are there not several crucibles in each furnace ?

Yes; each furnace holds eight or ten, so set upon stands that the fire can get all around them. The crucibles are set round in a ring, and in front of each one is a door in the wall of the furnace, through which the workmen can fill the crucible with frit or take out the glass.

Does it not take a great heat to melt the frit?

Yes; when the crucibles are filled the doors of the furnace are closed tight, and the fires are kept up for about twenty-four hours, when the frit will be melted into a liquid.

Are the crucibles then taken out of the furnace?

No; the crucibles are never taken out until they are so burned that new ones have to be put in. When the frit is melted the heat is let go down until the glass becomes about as thick as paste, and it is then kept like that until it is all used up by the workmen, who work day and night, six hours at a time.

How is glass made into bottles, decanters, goblets, wine-glasses, etc.?

Mostly in a way called blowing. The workman has an iron pipe, called a blowing tube, on one end of which he takes up a little of the melted glass out of a crucible. By blowing in the other end of the tube he makes this into a glass bubble, which he then shapes with different tools into the form wanted.

Are all kinds of glass dishes made in this way ?

No ; many tumblers, goblets, bottles, and other things are made by blowing a bubble of glass and then pressing it into shape in a mould, which opens and shuts like a bullet-mould.

How is window-glass made ?

Common window-glass is made by blowing a large glass bubble and then opening it and spreading it out flat. Plate-glass is made by rolling melted glass out thin on an iron table.

Is all glassware fit for use as soon as made ?

No ; it is very brittle, and will break easily. It has to be baked hot again in an oven and then left to cool slowly : this toughens it so that it is less apt to break.

Is not glass cutting really a grinding ?

Yes ; the glass is not cut at all, but is ground down by being held against little wheels wet with sand and water, and afterward with a soft kind of grinding powder.

How is colored glass made ?

By mixing colors made of different metals with the frit and melting them together.

Is stained glass the same as colored glass ?

No ; it is made by painting the surface of clear glass in much the same way in which porcelain is painted, only metal instead of glass colors are used. The glass is then

heated in a furnace until the colors are stained into it. In this way are made the large pictures seen in church windows.

Was not glass formerly made out of ground flints ?

Yes ; and from this flint glass got its name. But now pure white quartz sand is mostly used, the best in the world being found in Massachusetts.

Are flint and quartz, then, made up of the same material as sand ?

Yes ; only flint and quartz are in the form of rock, and sand is the same rock ground up in different ways.

Is not quartz sometimes found in beautiful crystals ?

Yes ; as clear as ice or glass, and so hard that it will scratch glass and strike fire against steel. Sometimes, too, it is found of a violet color, and it is then called amethyst.

Are not agates also a kind of quartz ?

Yes ; quartz colored with iron in different ways. When cut open they show many beautiful forms, in some the colors being in layers, in some in wavy lines, while in others they look like moss, leaves, and other things.

What is the agate named from ?

From the river Achates, in Sicily, where many were found in old times.

What are agates used for ?

They are set in rings and seals, and made into beads, handles for knives and forks, sword-

hilt, cups, and many other ornamental things.

Are there not other stones much like the agate ?

Several, which differ from it only in the way they are colored. Among them are the carnelian, chalcedony, onyx, sardonyx, and bloodstone.

Are not carnelians found of different shades of red and yellow ?

Yes ; but the most valuable kind is deep red. Some of the commonest ones are flesh-color, and from these the stone got its name, carnelian being from a Latin word meaning flesh.

Of what color is chalcedony ?

Commonly milk-white or whitish yellow. It is sometimes found in such large pieces that cups and other vessels are made of it.

What was it named from ?

From the ancient city of Chalcedon, in Asia Minor, near which much was found.

Was not the onyx named from the Greek word "onux," which means a finger-nail ?

Yes ; because the colors in it are in flat layers, like the marks in the human finger-nails. The layers are commonly white and brown, white and dark red, or white and black.

Are not these layers very useful in cutting these stones for jewelry ?

Yes; for sometimes a head or other figure is cut in one layer, leaving the other one behind for a background or kind of frame.

Are not the figures sometimes cut in relief—that is, raised up above the surface—and sometimes cut into or below the surface?

Yes; those cut in relief are called cameos, and those in which the figure is cut into the surface are called intaglios.

Are not cameos also made out of shell?

Yes; out of a kind of conch-shell which has flat layers of different colors like the onyx. As they are softer and easier to cut, they are cheaper than stone cameos.

What is the sardonyx?

A valuable kind of onyx, marked with layers of white and rich orange-brown. It is named from Sardis, in Asia Minor, near which the ancients found it.

What are the colors of the bloodstone?

Green marked with red spots like blood. It is sometimes called oriental jasper.

What is jasper?

A kind of precious stone made up mostly of quartz and clay. There are many colors, and some are striped, spotted, and clouded very beautifully. It is used for setting in rings and seals, and for the ornamenting of costly buildings.

Is not the opal also made of quartz?

Opal is of the same material as quartz, but is much more beautiful. Precious or noble opal, as it is called, is bluish or yellowish white, and has in it a fine play of colors like the colors of the rainbow.

Is it not much valued ?

Yes; for setting in jewelry. The finest opal is brought from Hungary.

Is there also a common kind of opal ?

Yes; of many different colors, but it has no rainbow tints in it. It is cut in large slabs, and used for small table-tops, and for making boxes and other ornamental things.

What is lapis lazuli ?

A stone of a beautiful sky-blue color, much used for jewelry. It is also carved into vases, cups, and other ornaments.

Where is it found ?

Mostly in Persia, China, and Siberia, but some is brought from Chili and California.

Is not the blue paint called ultramarine, much used by artists, made from this stone ?

It used to be, but now the paint is made by mixing together the things of which the stone is made up.

Are there not other colors used by artists which are made from stones ?

Yes; cobalt blue, which is almost equal to ultramarine, is made from the metal cobalt.

It is much used for painting porcelain and glass, and for coloring enamels, tiles, and paper hangings. Green and yellow paints are also made from it.

What is umber ?

A brown earth found in the island of Cyprus, used as a paint. It is sometimes burned to make it a deeper brown.

Is not sienna, from which a brownish paint is made, also a kind of earth ?

Yes; it gets its name from Sienna, in Italy, near which it is found. It also is sometimes burned to make it a deeper brown.

What is ochre ?

A kind of earth colored with iron. Red, yellow, and brown paints are made from it.

What is rottenstone ?

A soft, brown, clayey stone, easily ground to powder, and much used for polishing brass and other metals.

Is not emery also used for polishing ?

Yes; hard stones, plate-glass, and metals are polished with it.

Where is it found ?

It is dug mostly in the island of Naxos, in the Grecian Archipelago. It is ground up and sifted into powder of different fineness. Emery-paper, emery-cloth, and emery-sticks, used for polishing different things, are made from it.

What is pumice ?

A hard, grayish-white stone, thrown out of volcanoes ; it is full of little holes, and so light that it will sometimes float on water. Pumice is used, both in lumps and ground to powder, to polish wood, stone, glass, metals, and other things. It is brought mostly from Italy and Germany.

What is mica ?

A mineral found in little shining scales in granite and some other rocks.

Is it not what is commonly called isinglass, which we often see in the doors of stoves ?

Yes ; it is sometimes found in sheets large enough to be used instead of glass in windows and lanterns.

Where does it come from ?

The largest sheets are brought from Siberia and from Sweden, but very large pieces have been found in New Hampshire and North Carolina.

Has not granite some quartz in it also ?

Yes ; granite is made up mostly of grains of quartz and of another stone called feldspar, mixed with scales of mica. When the three are so mixed that the stone can easily be split into slabs, it is called gneiss.

Is not granite one of the most valuable of building-stones ?

Yes ; it is prized for its hardness and

strength, and because the weather does not easily harm it. It is therefore much used in public buildings, making docks, and paving streets.

What is granite called when it has in it, instead of mica, grains of another rock called hornblende?

Syenite; and it is named from Syene, in Egypt, where much of it is found. Syenite is commonly red, marked with dark green or black by the hornblende.

Will not some hornblende split up into fine threads, like flax?

Yes; and it is then called asbestus. These threads have been woven into cloth which will not burn in any common flame. It has therefore been made into clothes, and has been used for lampwicks, for covering roofs and floors, and for lining safes.

Did not the ancients sometimes burn the bodies of the dead in sheets made of asbestus?

Yes; and they were thus able to get the ashes of their dead without getting them mixed with wood ashes.

What did they do with the ashes of the dead?

They put them into vases or urns, which were placed in the tomb instead of the body itself.

What is sandstone?

A kind of rock formed of grains of sand cemented or fastened together with lime, clay, or other things.

Are there not many kinds ?

Yes; many kinds and colors: some are fine and some are coarse, and some are very lasting, while others soon crumble to pieces when exposed to the weather.

What are the uses of sandstone ?

Fine sandstone is much used for building, and coarse sandstone for making millstones.

Is not the "brown stone" used for building houses in New York and other cities a kind of sandstone ?

Yes; it is brought mostly from Connecticut and New Jersey. A lighter, yellowish-brown kind comes from Nova Scotia.

Of what kind of stone are the large slabs called flagstones, used for covering sidewalks ?

They are a kind of sandstone mixed with clay, which splits easily.

What is slate ?

A hard tough rock, made up generally of clay instead of sand, which easily splits into thin plates.

Is it not of different colors ?

Yes; it is usually bluish black or greenish blue, but it is sometimes green and reddish brown.

Where is slate mostly found ?

The largest slate-quarries in the world are in Wales. There are also fine quarries in Scotland and in France, and in several parts of the United States, especially in Maine,

Vermont, New York, Pennsylvania, Maryland, and Virginia.

What are the uses of slate?

It is used for roofing buildings, for making school-slates and slate blackboards, for the beds of billiard-tables, and for mantels, table-tops, and other ornamental furniture.

How are school-slates made?

The slate is cut and split into the right shape, and then polished smooth with pumice-stone. Slate-pencils are cut by a machine out of a soft slate-stone, of which the best is found in Vermont.

What are the most precious of all stones?

The diamond, the ruby, the sapphire, and the emerald.

Is not the diamond the most valuable of all?

The diamond has more uses than the others, but it does not cost so much money as the ruby and the sapphire. A fine ruby is worth three times as much, and a fine sapphire twice as much, as a diamond of the same size.

Are not diamonds used principally for setting in jewelry?

Yes; but small diamonds and pieces of diamonds are used for cutting other diamonds and gems; by glaziers for cutting glass; by watchmakers for drilling holes in rubies and other hard stones to put in the works of watches; and by gem engravers for

cutting cameos and intaglios in agates and other stones.

Is not the diamond the hardest of all stones ?

Yes; a diamond can be cut only with a diamond.

Why do diamonds have to be cut ?

When dug out of the earth they are usually covered with a reddish crust. When this is taken off their brightness is seen, but they are of a bad shape and not fit for setting in jewelry. Each one of the many little faces or flat sides which we see in them are all made by rubbing with another diamond set in the end of a stick, and by grinding it smooth afterward on a swiftly-turning steel wheel wet with oil and diamond-powder.

What is a diamond of the first water ?

One which is perfectly clear and without color. Diamonds are found of many colors, but colored ones are not worth so much as clear ones.

Where do diamonds come from ?

The best are found in India, but some very fine ones have been brought from Brazil. Many have been found lately in South Africa, and some small ones have been found in the United States.

Are not diamonds made of the same substance as coal and black-lead ?

Yes; all are made of carbon. The only

difference is that the diamond is pure carbon turned into crystal, while coal and black-lead are not quite so pure, and are not crystallized or turned into crystal.

Is not common charcoal also carbon ?

Yes ; but it is not so pure as hard coal or black-lead.

Is not the ruby of a beautiful red color ?

Yes ; the oriental ruby, which is the most valuable kind, is of the color of pigeon's blood ; but some rubies are rose-color, and some are so dark as to be nearly violet or brown.

Is not the garnet also a red stone ?

Yes ; and some garnets when set in gold look almost as well as rubies ; but they are much cheaper. The best garnets come from Ceylon, Burmah, and Greenland.

Where are the finest rubies found ?

In Ceylon and Burmah. One of the titles of the King of Burmah is "Lord of the Rubies."

Is not the sapphire a very hard stone ?

It is next to the diamond in hardness, and next to the ruby in value.

What is the color of the sapphire ?

There are sapphires of different colors, but the stone commonly called sapphire is of a beautiful purplish blue. The finest come from Ceylon, but some are brought from India and Persia, and a few from Russia.

What is the color of the emerald ?

The true emerald is of a rich green ; an emerald of a pale bluish green is called an aquamarine.

Are not the finest ones found in South America ?

Yes ; in the valley of Mozo, in the United States of Colombia. The finest aquamarines are brought from Siberia, Hindostan, and Brazil.

Is not the topaz a precious stone ?

Yes ; but it is not very valuable. It is commonly colorless like glass, but is sometimes yellow ; red, blue, or green.

But is there not a valuable topaz ?

Yes ; the oriental topaz, which is of a beautiful deep orange-yellow ; but this is really a kind of sapphire and not a topaz.

What is turquoise ?

A beautiful sky-blue stone, found chiefly in Persia. In Europe and in this country it is set in jewelry with pearls and diamonds, and in Persia and other eastern countries it is used to ornament bridles, saddle-cloths, girdles, and sword-handles.

From what does it get its name ?

From Turkey, because the first were brought from that country.

What is the most important of all the metals ?

Iron ; for by its aid almost all the arts are carried on.

Is not this metal dug out of the earth ?

Yes ; but not as a metal, for iron is not found pure ; when taken from the earth it is a kind of earthy ore, mixed with other things from which it has to be freed before it is fit for use.

How is this done ?

By smelting it ; that is, by melting it in great stone furnaces, and separating it from the impure things while it is melted.

Do not other things have to be put into the furnace with it ?

Yes ; coal for fuel, and limestone, commonly called the flux.

What is the use of the flux ?

When the iron ore is melted the flux mixes with the earthy matter in it, and forms a kind of melted glass called slag, which, being lighter than the iron, floats on top and is drawn off, leaving the melted iron by itself.

Is not the iron also drawn off afterward ?

Yes ; it runs out in a bright golden stream into sand moulds on the floor, where it cools into little short bars called pigs, and becomes pig or cast iron.

What is the furnace called in which the ore is thus melted ?

A blast-furnace, because blasts of air are forced into the bottom. These make the fire burn very fiercely and cause a great heat.

What is cast iron used for ?

As it is not pure iron, but has much carbon in it, it is only fit for making things which are cast in moulds, such as gas and water pipes, lamp-posts, pillars and fronts of buildings, and heavy stoves.

What is wrought iron ?

Iron which can be hammered or rolled into plates. It is made out of cast iron by melting it in another kind of furnace, in which the carbon, sulphur, and other impure things in it are burned out. The iron is then hammered while red-hot under great power hammers ; that is, hammers worked by steam or water power. This drives out all the slag left in it, and makes it more solid.

Is not wrought iron also softer than cast iron ?

Yes, because the carbon is got out of it ; it is, therefore, much more easily worked, and may be hammered into bars, rolled into plates, and drawn out into wire. Pieces of wrought iron may be welded together—that is, they may be united into one by hammering them together when red hot.

Is not wrought iron much more useful than cast iron ?

Yes ; but it costs more to make, for which reason many things are made of cast iron.

What things, then, are made of wrought iron ?

Things which need more toughness than

there is in cast iron, such as iron plates for steam boilers, and for ships, anchors, chains, horseshoes, railroad iron, spikes and nails, and the iron parts of tools.

What is galvanized iron ?

Iron covered with a thin coating of zinc, which keeps it from rusting.

What is malleable iron ?

A kind of cast iron made very tough by baking the things made of it for six to ten days in a furnace. If the cast iron used is good, the things thus made are tough enough to be hammered, on which account they are called malleable, from the Latin word *malleus*, which means a hammer.

What is steel ?

A fine kind of iron which has a little more carbon in it than wrought iron and a little less than cast iron. It is harder, finer in its grain, and more springy than iron, takes a brighter polish, and does not rust so quickly.

What are the uses of steel ?

All kinds of cutlery, such as knives, razors, scissors, swords, scythes, and axes, are made of it, and it is also used for casting cannon, for making rails for railroads, and for machinery, bridges, and ships.

What is loadstone ?

A kind of iron ore which has the power of

drawing iron to itself. If a piece of loadstone be held near to iron filings, they will cling to it in a mass; and needles, and even tacks and small nails, may be raised up by it.

Has not the loadstone another name?

Yes; it is called a natural magnet, and its power of drawing iron is called magnetism.

Cannot the loadstone give this power to pieces of iron and steel, so that they also can draw iron to themselves?

Yes; by rubbing the loadstone several times along a piece of iron or steel, the iron or steel will become a magnet and have the same power. A magnet thus made is called an artificial magnet.

Will such a magnet keep this power long?

Common iron will not keep it long, but steel will keep it always.

Has not the magnet another power?

Yes; if rightly fixed, it will always point toward the north and south.

Is not this of great value to man?

Yes; the mariner's compass is simply a steel needle made into a magnet and held up on a sharp point so that it can turn round in any direction. One end of it will always point toward the north, and sailors can thus find their way in the middle of the ocean with as much ease as if they kept always in

sight of land, as ships had to do before the compass was found out.

Are not magnets also very useful in other ways?

Yes; the telegraph and the telephone are both worked by means of magnets.

What is the difference between the telegraph and the telephone?

The word telegraph means far-writer, and telephone means far-talker; by the one we are able to send messages to a great distance by means of signals carried over a wire by electricity, and by the other we are enabled to speak a great distance, so that a person at the other end of the wire can hear what we say.

What is copperas?

A substance of a grass-green color, made up mostly of iron and sulphur, largely used in dyeing black and in making ink.

Is it not also called green vitriol?

Yes; and sulphuric acid, which was at first made from it, was named oil of vitriol.

What is blue vitriol?

A blue substance, made up mostly of copper and sulphur. It is much used in the arts, especially in dyeing and in making green paints.

Is there not also a white vitriol?

Yes; it is made up mostly of zinc and sulphur. It is used in printing calicoes, and as

a medicine, and is put into paints to make them dry quicker.

Is not copper also a very important metal?

Yes; and it was in use before iron. Almost all ancient nations used it largely in making bronze for statues, weapons, tools, and ornaments.

What is bronze?

A mixture of copper and tin, to which a little zinc and lead are sometimes added.

Are there not different kinds of bronze?

Yes; gun-metal bronze, from which cannon are cast, is made up of nine parts of copper and one part of tin; bell-metal, of about three parts of copper and one part of tin; and French bronze, from which most bronze ornaments and small statues are made, of nine parts of copper and one part made up of zinc, tin, and lead.

Is there not also a cheap false bronze?

Yes; many mantel ornaments and gas-fixtures are made of it; they are not bronze at all, but are merely castings in zinc, or spelter, as it is commonly called, covered with a paint or varnish to make them look like bronze.

Is copper ever found pure?

Sometimes; especially in the Lake Superior mines and in some parts of South America; but it is generally got out of ores, like iron, by smelting.

Is it not very hard to smelt ?

Yes; the ore usually has sulphur, iron, and other things in it, and has to be smelted several times to get the pure copper from it.

Is not copper much used in the arts ?

Yes; and it is very valuable on account of its strength and the ease with which it can be hammered into plates and drawn into wire.

Why are the bottoms of ships covered with copper plates ?

Because it lasts longer than plates of other metal, and because its rust is so poisonous that shell-fish will not stick to it.

What is malachite ?

A beautiful green copper ore, marked with stripes and circles of different shades of green. It can be cut and polished like a precious stone, and made into ornaments; but it is principally cut into thin layers and used as a veneer for table-tops and costly furniture.

Where is it mostly found ?

In Siberia; and the Russians are very skilful in working it.

What is verdigris ?

A kind of green rust which collects on copper. It often forms in copper kettles in which anything sour is cooked; and, as it is a strong poison, great care should be taken in cleaning such vessels.

What are its uses ?

A fine green paint is made from it, and it is used for coloring porcelain green, and with logwood for dyeing cloths black.

How is enough got for these things ?

It is made by piling up plates of copper with layers of grape-skins between them. In a few weeks a green crust forms on the copper ; this is scraped off, made into a paste with vinegar, and pressed into moulds.

Is zinc found as a metal ?

No ; it is mostly found in the form of an ore called blende, which is made up of zinc and sulphur.

Why is zinc so much used for making things likely to be wet, such as bath-tubs, water-spouts, tanks, and roof-covers ?

Because it rusts a little in moist air, and the thin crust of rust thus made sticks closely to it and keeps it from rusting any more.

Does iron rust in a different way ?

Yes ; when iron rusts, the rust scales off so that the air can get to the part under it, and so it keeps on rusting until it is all used up. For this reason, iron plates, wire, and chains are often covered with a coat of zinc.

What are some of the other uses of zinc ?

It is used in making brass and bronze, pinch-beck or false gold, white vitriol, and the paint called zinc white.

Is not a white paint also made out of lead ?

Yes; white lead is the paint most commonly used in painting houses; red lead, used in making red paint, and chrome yellow, used in making yellow paint, are also made from lead.

Where do we get lead from ?

Mostly from the ore called galena, which is made up of lead mixed with sulphur.

How is the metal separated from the sulphur ?

It is first roasted or burned in great heaps, by which some of the sulphur is driven off; it is then smelted in a large square furnace, which is kept burning all the time. As the lead melts, it is drawn off at the bottom and run into moulds which make it into small blocks called pigs.

Is not lead-smelting very unhealthy business ?

Yes; the fumes or vapors which rise from the furnaces are so poisonous that all the grass and other plants around them are killed.

Does not lead rust much like zinc ?

Yes; the rust forms a thin coating over its surface, which sticks closely to it and keeps it from further change; and this is the reason why it is so much used for water-pipes and cisterns, and for covering the roofs and gutters of houses.

Why is it, then, that lead water-pipes make the water which runs in them poisonous?

Because some kinds of water will corrode or eat lead and thus make it rust more; and they thus take up from it a poison which makes the water dangerous to drink.

How is sheet lead made?

By rolling slabs of lead between heavy iron rollers until they are brought down to the right thinness. This is called milling the lead.

Do the Chinese make the thin sheet lead used in tea-chests in this way?

No; they make their sheet lead by pouring melted lead on a flat stone slab, and then putting another flat slab on top of it, thus pressing it out thin; but they now get most of the sheet lead used for packing tea from England.

Are not shot made out of lead?

Yes; of lead with a little arsenic mixed in it.

Is arsenic then a metal?

Yes; when pure it is a gray, shining metal; the white poisonous powder commonly called arsenic is only the rust of the metal.

Why is arsenic put into lead for making shot?

Because it makes the lead softer and causes it to take the round form more easily.

Are shot made in moulds like bullets?

No; they are made by pouring melted lead on to iron plates full of little round holes, at the top of high towers. The plates are so placed that the lead, after going through the holes, will fall down to the bottom of the tower into a cistern of water. The shot are made round by falling through the air, and are cooled by the water.

Are the shot thus made all exactly alike?

No; they have to be separated into different sizes by sifting them through sieves; and they are afterward polished by turning them round in a barrel with some powdered black-lead.

Are not the types with which books are printed made also of lead?

Yes; but as lead alone would be too soft, a little antimony is put in to harden it, and a little tin to toughen it.

What is antimony?

A bluish-white metal, so hard that it can be made into a powder by pounding.

What other use has type-metal?

It is made into stereotype plates.

What are stereotype plates?

Plates used for printing, in which each page is made of solid metal instead of movable types.

How are they made?

When the types are set up into a page, they are fastened tight so that none of them can drop out. Their face is then oiled, and covered with a mixture of plaster of Paris and water. The oil keeps this from sticking to the type, and in a short time the plaster becomes so hard that it may be taken off, when it will be found to be a perfect mould of the face of the type.

Is the type-metal then poured into this mould?

No; the mould is set into a kind of shallow iron box, so made that when it is put into melted type-metal the metal will flow in and fill it. The box is then taken out and cooled, and the plate inside, after the plaster has been broken off, will be an exact copy of the type from which the plaster mould was made.

Can books be printed from such plates as well as from type?

Yes; because the face of the plate is just like that of the type.

Why is it better to print from such plates than from the type?

Because it is cheaper; the type would soon become worn out from use in printing, but many stereotype plates can be made from type without hurting it, and each plate can be used as long as the type could be used.

Are not all the great city newspapers printed from stereotype plates?

Yes; but their plates are mostly made from papier-maché instead of plaster moulds.

What are electrotype plates?

They are much like stereotype plates, but have a copper face and a type-metal back.

Is not tin a harder metal than lead?

Yes; it is harder than lead and softer than gold; it may easily be hammered into plates and drawn out into wire.

What is tinstone?

The ore from which tin is mostly got. It is heated in furnaces with charcoal, and the tin melts and is drawn off and cooled in iron moulds. The tin blocks thus made are called block-tin.

What is tin mostly used for?

Its principal use is for covering other metals to keep them from rusting, as tin does not rust at the common heat of the air.

Is tin-ware made out of plates of tin?

No; tin-ware is made of sheets of iron covered with a thin coating of tin by dipping them into melted tin and letting them stand in it about an hour. Bridle-bits, stirrups, tacks, small nails, and other things are tinned in the same way.

Are not copper and brass also sometimes coated with tin?

Yes; pins, copper kettles, and other cooking vessels, bath-tubs, etc., are often coated with tin.

How are pins made?

They are made by machines out of brass wire of the right size, and are afterward covered with tin by boiling them in weak nitric acid in which are put pieces of tin. They are lastly polished by turning them round in barrels of sawdust.

Is not tin often mixed with other metals?

Yes; Britannia metal, the white metal out of which are made tea-sets, castors, and vegetable-dishes, is made of tin and antimony, with a little zinc and copper; pewter, from which ale and beer mugs, ale-pumps, syringes, and common inkstands are made, is composed of the same things, but is a little softer than Britannia metal; and solder, used by plumbers to join together lead pipes and other parts of their work, is made of tin and lead.

What are some of the other uses of tin?

It is rolled out into very thin sheets, called foil, which are used for silvering the backs of looking-glasses, lining tea-caddies and other boxes, wrapping up tobacco and other things.

Is not some other metal used with the tin-foil in silvering looking-glasses?

Yes; mercury, commonly called quick-silver, because it looks like silver and flows quickly, is used with it.

Is mercury, then, a liquid?

Yes; it is the only metal which is liquid at the common heat of the air.

How is it fastened to the backs of looking-glasses?

A sheet of tin-foil is spread out on a smooth level table of stone or iron. Mercury is then poured over the foil until it is about a quarter of an inch deep, it being kept from running off by strips of glass placed along three sides of the table. The plate of glass is then slid on flat, from the open side, in such a way that its edges pushes off most of the mercury before it, leaving just enough on the tin-foil to cover it. Heavy weights are then put on the glass, and it is let stand a few hours, when it is taken up and set away to dry.

Who first made looking-glasses in this way?

The Venetians, more than three hundred years ago. The looking-glasses of the ancients were made of polished metals, mostly of bronze, but sometimes of silver.

Is mercury found pure in the earth?

Sometimes small drops of it are found, but it is mostly got from an ore called cinnabar, in which the mercury is mixed with sulphur.

How is it separated from the sulphur?

By heating it in close iron vessels with quicklime. The lime takes the sulphur to itself, and the mercury passes off as a vapor

or steam through pipes into a cool vessel, where it is changed into liquid mercury.

Has not mercury other uses ?

Yes; it is used in thermometers and barometers, and in getting gold and silver from their ores.

What other things do we get from mercury ?

The beautiful red paint called vermilion is made from it, as is also the medicine called calomel.

Where is cinnabar mostly found ?

In Spain, Austria, California, and Peru.

How are gold and silver got from their ores with mercury ?

Mercury has the power of mixing with these metals and forming what is called an amalgam. The silver or gold ore is pounded up fine and mixed with mercury, which seizes upon all the little grains of metal and unites with them, leaving the pieces of rock and the dirt by themselves. The mercury is afterward separated from the silver or the gold, which is thus left pure.

What is this way of getting these metals called ?

Amalgamation.

Is not most silver got in this way ?

Yes; but a good deal is got out of the lead ore called galena. This is melted in large iron pots and let cool slowly, when the lead forms in hard crystals and sinks to the bot-

tom, from which it is dipped out in strainers, which let the silver run through. By melting the metal several times and thus straining it, most of the lead can be got out, leaving the silver nearly pure.

Are coins made out of pure silver ?

No; silver is harder than gold but softer than copper, and is therefore too soft to wear well. To make it harder, a little copper is commonly mixed with it.

Are the silver coins of all countries made of the same kind of silver ?

No; those of the United States and of France are made of nine parts of silver and one part of copper; but those of Great Britain have in them a little less copper, and those of Germany a little more.

What is nitrate of silver ?

A kind of salt made up of silver and nitric acid. It is much used in taking photographs, in making indelible ink and hair-dyes, and as a medicine.

What are the principal silver-producing countries of the world ?

The United States and Mexico. The most important silver mines are in Nevada and Colorado. Much is also got in South America and in Europe.

Is not gold the only yellow metal ?

Yes; and it is also the most lasting, the

most easily worked, and the most easily hammered out and drawn into wire of all the metals.

Is it not found almost everywhere ?

Yes ; but it is not plentiful enough in all places to pay for the labor of getting it. Even sea-water has gold in it, and there is said to be more in the waters of the ocean than has yet been taken out of the earth.

In what kind of rocks is gold mostly found ?

In quartz rock ; but the gold found in rocks is commonly in smaller grains than that dug from placers, and it takes much more work to get it out.

What are placers ?

Places in valleys and river-beds where gold, washed down from mountains, is found mixed with gravel and sand. Gold found in placers is in dust, scales, grains, and lumps.

Are not the lumps commonly found deeper than the grains and scales ?

Yes ; as gold is heavier than sand and gravel, it usually works its way down until it reaches the rock under it, where it settles in hollow places called pockets. In placer-mining the earth is dug away down to the rock, where the large pieces of gold are found in the pockets ; but all the top soil is carefully washed and searched, so that even the little scales and grains may be saved.

How is the gold got from rocks?

The rocks are first blasted out with gunpowder, and then crushed to powder in a stamping-mill. This is then washed on a slanting table, and the quartz dust and earthy matter are washed away, leaving the gold, which is heavier, on the table. If the dust is very fine, mercury is mixed with it, and the gold is got by amalgamation.

Is not pure gold almost as soft as lead?

Yes; and it is therefore unfit for making coin or jewelry until it has been hardened by mixing it with some other metal.

What is commonly used to harden it?

Copper, because it does not change the color much, except to make it a little redder.

Are the gold coins of all nations made of the same kind of gold?

No; those of the United States and of France are made of nine parts of gold and one part of copper, but those of Great Britain of eleven parts of gold and one of copper.

How do jewellers mark the fineness of gold?

By dividing it up into twenty-four parts called carats. For instance, gold eighteen carats fine has in it eighteen carats of pure gold and six carats of other metal.

Cannot gold be hammered out very thin?

Yes; into leaves so thin that two hundred

thousand (200,000) of them piled up will not be more than an inch high.

What is this thin gold called ?

Gold-leaf. This is the kind of gold used for gilding; things covered with it are as beautiful as pure gold itself.

How is gold-leaf made ?

In a way called gold-beating, and the workman who makes it is called a gold-beater. The gold is first rolled out between steel rollers into flat ribbons. These are next cut up into pieces an inch square, piled up with a piece of parchment between each, and beaten with hammers until each piece is four inches square. They are again cut into four parts, and piled up with pieces of gold-beaters' skin between each.

What is gold-beaters' skin ?

A thin skin made out of the large intestine or gut of the ox. The pile is again beaten, but with a lighter hammer, then cut again and beaten a third time until the pieces are thinner than tissue-paper. The edges of the pieces are then cut even and they are put between the leaves of little books, twenty-five in each book.

What is dentists' gold ?

Gold-leaf beaten but once; it is thicker than the gold-leaf used for gilding.

Are not silver and copper leaf made in the same way ?

Yes; but as pure silver is apt to turn black in the air, silver-leaf is always made of part gold and part silver.

How are gold lace and gold braid made ?

By weaving together gold threads. The threads are really yellow silk threads covered with flat gilded wire. The wire, which is made of silver with a thin coating of gold on it, is flattened between steel rollers, and then twisted round the thread by a small machine.

What metal is heavier than gold ?

Platinum—a metal which looks something like silver, but is not quite so white.

Is it not more valuable than silver ?

Yes; it is worth about five times as much on account of its scarcity, it being found in only a few places. Most of the platinum used in the arts comes from the Ural Mountains, in Russia; but some is got in South America, California, Ceylon, and Borneo.

Is it not a very useful metal ?

Yes; because it cannot be melted in any common heat, does not rust in the air, and is not eaten by any single acid.

Can it not be eaten by two acids mixed together ?

Yes; by a mixture of nitric and muriatic acids.

What is this mixture called ?

Aqua regia, which is Latin for royal water. It is so named because it is the only liquid which will dissolve gold, which was called in old times the king of metals.

What are the uses of platinum?

It is used by chemists to make crucibles and other things which have to stand a very hot fire; by acid-makers for vessels to make sulphuric acid in; by dentists for filling teeth; and in some countries for making coins.

Is not nickel also a silvery-white metal?

Yes; and it is much used for plating other metals, to which it gives a beautiful silver-like surface which keeps them from rusting. Among the things plated with it are knives, forks, tea-sets, buckles, bits, skates, surgical instruments, the arms of railway-seats, chandeliers, and gas-fixtures.

Are not coins also made of it?

Yes; the copper coins of several European countries are part nickel. In the United States, five and three cent pieces are made of one part nickel and three parts of copper.

What is German silver?

It is made of one part of nickel, one part of zinc, and two parts of copper. This makes a metal nearly as white as pure silver, and which can be polished very bright.

Where is nickel found?

In many parts of Europe, and in the United States, mostly in Pennsylvania and Connecticut. It is usually found mixed with other things, such as sulphur and arsenic, and it is hard to separate it from its ores.

From what does nickel get its name?

The German miners at first called it *kupfernickel*, or false copper, because they tried in vain to get copper from it; but it was finally found out to be another metal, and then it was called simply nickel.



THE VEGETABLE KINGDOM.

What is bread made of?

Flour.

What is flour?

Grain ground to powder.

Is the powder of any grain used for making bread rightly called flour?

Yes; but the flour of Indian corn is commonly called corn-meal, and that of oats oat-meal.

What is white bread made of?

Wheat flour.

Has white bread always been as common as it now is?

No; in old times bread made of barley, oats, and rye was more used than wheat bread, which was then a great luxury.

Are not barley and rye bread still much eaten in some countries?

Yes; especially in cold countries like Sweden and Norway, where those grains grow better than wheat; and in Scotland people eat oaten cakes, which many like better than wheat bread.

What is bran ?

The husks or skins of any grains ; but generally the name is given to the husks of wheat.

Is not wheat bran good to eat ?

Yes ; when wheat is ground the bran is sometimes left in, and the flour is then called Graham flour, from which Graham bread is made ; but it is commonly sifted out and only the white powder of the inside of the grain is kept for flour, the bran being used for feeding cattle.

Is not the wheat plant a kind of grass ?

Yes ; all the grain plants are grasses. The grains themselves grow in heads on the top of the stalks.

How is the grain got ?

When ripe the stalks are cut off near the ground, and made up into bundles called sheaves. These are afterward threshed, either by hand or by threshing machines, by which the grain is separated from the stalks. Threshing by hand is done with a tool called a flail, with which the wheat is pounded on a barn floor until the grains all drop off.

What is done with the stalks ?

The stalks make what is commonly called straw. This is largely used for making straw hats and bonnets, and is also chopped up and mixed with food for cattle.

Are not all the food grains together called the cereals ?

Yes ; they are named from Ceres, the heathen goddess of farming.

What are the principal cereals ?

Wheat, barley, rye, oats, Indian corn, and rice.

Are not macaroni and vermicelli also made from wheat flour ?

Yes ; but the flour is coarser than that used for bread. It is made into a stiff dough and then forced through holes in the bottom of an iron barrel. For macaroni the holes are like little rings, so that the dough comes out at the bottom in the form of pipe-stems ; but for vermicelli they are very small and round, so that the dough comes out like little threads.

What is Italian paste ?

Macaroni dough rolled out in thin sheets, and cut into stars, rings, letters, figures, and other forms. It is much used for thickening soups.

What is wheaten groats or grits ?

The grains of wheat ground coarsely. It is sometimes called crushed or cracked wheat.

Is it not very healthful ?

Yes ; because it has in it all the parts of the grain, none being sifted out, as in flour, and is more easily digested than fine flour.

What is starch ?

A white substance found in all grains and other vegetables.

What is its principal use ?

Most people think of starch only as a thing used by washerwomen to stiffen linen with, but it really forms a large part of the food of man.

Is there not much of it in the cereal grains ?

Yes; rice is nearly nine tenths starch, and Indian corn and barley more than two thirds starch; and wheat, rye, and oats have in them nearly as much.

How can the starch be got out of flour ?

Mix the flour with water enough to make a thin paste. Put this into a cloth and work it in a dish of water as long as the liquid which runs from it looks milky. Let the water stand until it becomes clear; then pour it off and dry the starch, which will be found settled on the bottom.

Will there not be something left in the cloth after the starch has been washed out ?

Yes; a tough sticky substance called gluten. It is this which makes bread firm. If wheat flour were all starch and had no gluten in it, bread made from it would crumble to pieces.

Is not gluten a necessary part of our food ?

Yes; and wheat is more valuable for food than rice, because it has more gluten in it.

Has not bran more gluten in it than the inside of grain?

Yes; and this is the reason why flour which has been sifted very fine is not so healthful for food as that made from the whole grain.

Why do beans and rice and other grains swell up when they are cooked?

Because the starch in them is made of little grains, which burst when cooked and swell up into a thick jelly.

What happens when dry starch is heated nearly as hot as boiling water?

It turns into a brown substance called dextrine, which, when mixed with water, makes a strong gum called British gum, used on postage-stamps and envelopes.

Are not calicoes stiffened with it?

Yes; and it is also used by calico-printers for thickening their colors.

What is barley mostly used for?

For making malt, out of which beer and ale are brewed.

How is barley made into malt?

By wetting it in great heaps and then spreading it over the floor of a dark room, where it swells and sprouts just as if it were planted in the earth. It is then dried on the floor of an oven, when the little sprouts drop off and are afterward sifted out.

Why is the grain made to sprout ?

Because it then has more sugar in it, most of its starch being thus turned into sugar.

How is malt made into beer ?

It is first ground or bruised, when it is called grist. The grist is mixed in a large wooden tub with hot water, and this liquid, which is called wort, is afterward drawn off and boiled in a great copper kettle with hops.

What are hops ?

The flowers of the hop-vine, which grows two or three times as high as a man. They are picked when ripe, dried, and packed in large bags or bales.

What is their use in making beer ?

They give the beer its bitter taste, make it bright and clear, and help to keep it from souring.

What is next done with the beer ?

It is strained and cooled as quickly as possible, and put into a large vessel called a fermenting tun, where it is left until it passes through a change called fermentation.

What is fermentation ?

A kind of working, in which the beer becomes heated, bubbles up and froths at the top, and in a short time gets a new taste and smell. Before fermentation it has a bitterish

sweet taste, but afterward it is much stronger and sharper.

What gives it this new taste ?

Some of the sugar in it turns into alcohol.

What is alcohol ?

The spirit or strong part in beer, cider, wine, and other liquors.

Is there no alcohol in liquors which have not fermented ?

No ; the alcohol is made by the fermentation. Thus wine, when first made, is nothing but sugar and water flavored with the taste of the grape, and it does not get the sharp taste of wine until some of its sugar has been turned into alcohol.

Can alcohol be separated from liquids in which it is mixed ?

Yes ; by distillation. The liquid to be distilled is heated, in a large close kettle called a still, just hot enough to turn the alcohol into vapor or steam ; this vapor then passes into another vessel which is kept cool, and the coolness makes it turn back into a liquid again.

Why does not the water of the liquid pass over with the alcohol ?

Because water needs more heat to turn it into steam than alcohol does ; therefore the alcohol will pass over before the water begins to boil much.

What is the difference between fermented and distilled liquors ?

Fermented liquors are those which have alcohol in them made by fermentation, such as beer, cider, and wine ; distilled liquors are fermented liquors which have been distilled, such as brandy, whiskey, rum, and gin.

Are not distilled liquors much stronger than fermented ones ?

Yes, because they have so much more alcohol in them ; and this is why people are made drunk quicker by them.

What is pearl barley ?

The grains of barley, which are called barleycorns, are yellowish brown on the outside and white on the inside. When stripped of the outer husk and rounded in a mill, they look like little pearl white shot, and make pearl barley, much used mixed with milk for babies' food.

Is not rye flour very dark colored ?

Yes ; bread made from it is quite brown, and it is coarser and not so good as wheat bread.

Is it not much eaten by some peoples ?

In Sweden the common people live largely on rye cakes which are baked but twice a year, and are therefore so hard that they have to be cut with a hatchet or saw. In New England rye flour is made into bread,

and it is also mixed with Indian meal in making brown bread.

Is not whiskey made from rye ?

Yes; what is called rye or Monongahela whiskey is largely made from it in this country; in Holland it is used with barley for making gin.

What is rye straw good for ?

Cheap straw hats are made from it, and it is used for stuffing beds and horse-collars, for the bedding of horses and cattle, and for thatching the roofs of buildings.

What are oats mostly used for ?

In this country for feeding horses, but in Scotland they form a great part of the food of the common people.

What is oat-meal porridge ?

A kind of hasty pudding made with oat-meal, and eaten with milk. Much is now eaten in this country, and it is a very strong and healthful food.

What are oaten groats or grits ?

The whole grains of oats freed from the husks. Emden grits, made at Emden, in Prussia, are the grains cracked into small pieces.

Is oaten straw good for anything ?

It is the best of all kinds of straw for fodder for horses and cattle.

Did not Indian corn first grow in America ?

Yes; it was not known in Europe before the discovery of the New World.

Is it not also called maize ?

Yes; and it is generally known by that name in Europe, where the common grain of the country is called corn. Thus, in England corn means wheat, in Scotland oats, and in Russia barley or rye.

Is not maize the Indian name of Indian corn ?

Yes; the Indians of the island of Hayti called it *mahis*, and this has been changed to maize.

Are there not many kinds of Indian corn ?

Yes; a kind growing in Brazil has ears no larger than a man's little finger, with grains about the size of mustard-seed, and others have very large ears and grains half an inch long; in some the grains are smooth, and in others wrinkled; and the grains differ much in shape and color.

Is not Indian corn one of the most important foods in the world ?

Yes; it is more used than any other grain, excepting rice.

What is succotash ?

The Indian name of a dish made of green corn and beans boiled together.

What are hominy and samp ?

They, also, are Indian names for ripe corn

broken or ground into coarse grains. Sometimes the whole grain, with only the skin rubbed off by pounding, is called samp.

What are made from corn-meal?

Many kinds of bread and cakes, and a pudding called hasty pudding, mush, or stir-about. It is also made into starch, which is sold under the names of corn-starch and maizena, and used for making puddings, cake, and blanc-mange.

Are not the husks and the stalks of corn also very useful?

Yes; very good paper has been made from the leaves and husks; the husks are used for filling mattresses and for weaving into mats, and the dried stalks and leaves are used for fodder.

Has not sirup been made from the juice of corn-stalks?

Yes, and sugar too; but they are not so good as those from sugar-cane.

Is not much whiskey also made from corn?

Yes; the kind called Bourbon whiskey, because first made in Bourbon County, Kentucky.

Is not corn sometimes so plentiful in the West that there are not granaries enough to hold it?

Yes; and in some places it has been burned for fuel.

Where does rice grow?

It grew first in the East Indies, where it

has been raised since the most ancient times, but it now grows in all the warm parts of Asia, Africa, and America.

Does not the best rice grow in the United States ?

Yes ; in North and South Carolina, in low damp land along the coast.

Does it grow best on damp land ?

Yes ; it needs much water, and the fields where it is planted are flooded twice in a season. The water is drawn off a few days before the rice is ready to cut.

Do not many people live almost wholly on rice ?

Yes ; it is the principal food of nearly a third of the human race, mostly in hot climates, such as southern China, India, Burmah, and Siam.

Is it as good for food as wheat ?

No ; it has too much starch and not enough gluten in it. Starch used in laundries and muslin manufactories for stiffening cloth is made largely from it.

Are not some strong drinks made of rice ?

The Japanese make a kind of beer called *saki*, the Chinese several kinds of wine, and the East Indians a liquor called *arrack* out of it.

What is rice-paper ?

A kind of thin paper used by the Chinese for painting flowers, insects, and other small

things on. It is not made from rice, but from the inner bark of a kind of tree.

What do people make bread of, in countries where the common grains do not grow?

Out of the seeds of a kind of grass called millet. Much millet is raised for food, both for men and cattle, in Africa, India, and in some parts of Europe.

Why is it called millet?

The name is thought to come from the Latin word *mille*, a thousand, because millet sometimes gives a thousand seeds for every one planted.

What is buckwheat?

A kind of grain much grown in the United States, France, and Germany. In Germany its flour is made into gruel, in France into bread, but in the United States it is mostly eaten in the form of breakfast-cakes.

What do the French call it?

Saracen wheat, because the Saracens, or Moors, are said to have brought it into Spain from the East.

Why do we call it buckwheat?

In old times in England it was called *boc* wheat, *boc* being the Saxon name of the beech-tree, and the plant was so named because its grains are three-cornered like beech-nuts.

What are brooms made of?

The heads or brushes of the broom-corn plant.

How does this plant grow ?

Much like Indian corn, but the head is larger, and the seeds grow on the head instead of in ears as in Indian corn.

Where did broom-corn first grow ?

In India, from which country it was carried to Europe. It is said that Doctor Franklin planted a single seed, which he took from a whisk of broom-corn brought from England, and that from it has sprung all the broom-plants now in this country.

What is done to broom-corn when it is ripe ?

The heads or brushes are cut off, leaving about six inches of stalk on each, and the seeds are scraped off by a machine which takes them off without hurting the broom-corn.

What are the seeds good for ?

They are fed to horses and to poultry, and sometimes, when ground into meal, to cattle.

How are brooms made ?

The broom-corn is put round the handles in layers, and each layer is wound tight with twine, until the broom is large enough, when it is pressed out flat and sewed with twine to keep it so. Whisk-brooms are made in the *same way*.

What are broom-handles made of?

Of basswood or of soft maple-wood turned round in a lathe.

What is sago?

A starch food made from the pith of several kinds of palm-trees which grow in China, Japan, and the East Indies.

How is it made?

The tree is cut down, the trunk split up, and the inside, which is soft, white, and spongy, is scraped out and beaten in cold water until all the starch is out of it. This, which is heavier than the woody part, sinks to the bottom. The water is then poured off, the sago dried, and afterward pounded up, sifted, and packed in boxes for sale. This is pearl sago, used for making puddings and as food for the sick.

Is it not sometimes made into bread?

Yes, in the countries where it grows; and it is the principal food of millions of people.

What is tapioca?

A starch food made from the roots of the mandioc or cassava plant, which grows in South and Central America and in the West Indies. The plant is nearly as tall as a man, and has a root much like that of a long beet.

How is tapioca made from it?

The root is grated and washed in water, which takes out a poison in the sap, and

afterward dried by heat and made into grains.

Is it not an important food in South America?

Yes; it is much eaten there, made into a kind of bread. In the United States it is used to thicken soups, and is made into puddings and blanc-mange.

What is arrowroot?

A starch food made from the roots and grains of several plants in the East and West Indies. The best is got from the roots of a plant largely raised in Bermuda, Jamaica, and other West India islands.

How is it made?

By grinding or pounding up the roots and washing out the starch in much the same way as sago is made.

Why is it called arrowroot?

It is supposed to have got its name from the use of its roots by the Indians to cure wounds made by poisoned arrows.

Is not the potato the most valuable of all plants, next after the cereals or grains, used for human food?

Yes; and it is now raised in almost all mild countries, and to some extent in warm and in cold countries.

Has it always been as plentiful as now?

No; it was not known in Europe until after the finding of the New World.

In what part of America did it first grow ?

In South America ; and it is supposed that it was first brought from there to North America by the Spaniards.

Why is it often called Irish potato ?

Because Ireland was the first part of Europe where it was much planted. It is said to have been carried there from Virginia by Sir Walter Raleigh about three hundred years ago.

From what island do we get the earliest potatoes sold in our markets ?

From Bermuda, where great quantities are raised every winter. As it is too hot there to keep them through the summer, potatoes for planting have to be sent there every autumn.

What is a potato mostly made up of ?

About three fourths of its weight is water, and the other fourth is about one part gluten and five parts starch.

Is not starch made out of potatoes ?

Yes, a good deal of starch is made from them ; and in some countries whiskey and brandy are distilled from them.

Is the sweet potato also an American plant ?

It was found growing here when Columbus came, and sweet potatoes were among the presents carried by him to Queen Isabella.

but some think that the plant grew in China and India long before America was known.

Was it not known in Europe before the white potato?

Yes; and it is the sweet potato which Shakespeare and other early English writers mean when they speak of potatoes.

Are not many sweet potatoes raised in the Southern States?

Yes; and a good many are grown as far north as New Jersey and Ohio.

Why are those which grow at the North more mealy than those which grow in the South?

Because they have more starch in them; those from the South are damper and sweeter because they have more sugar in them.

What is the yam?

A vegetable much like the sweet potato, but larger, some yams weighing thirty or forty pounds apiece.

Are not the roots coarser than those of the sweet potato?

Yes, and they are not so good for food; but they are much eaten, either roasted or boiled, in Africa, China, Japan, South America, and the West Indies.

Are there not several kinds of beets?

Yes; and they differ much in shape, size, and color.

What are mangel-wurzel beets?

A large and coarse but very sweet kind, much used for feeding cattle in winter.

Is not sugar made from beets ?

Yes ; from the juice of the white beet, in nearly the same way as cane-sugar. It is mostly made in France.

When did the French first make sugar out of beets ?

In the time of the Emperor Napoleon I., who, being at war with England, would not let British cane-sugar be brought into the country.

Where did the turnip first grow ?

In Asia and in Europe ; it was brought to this country first from Europe.

Is not the turnip crop a very important one in Great Britain ?

Yes ; farmers depend on it for winter food for cattle and sheep ; but in the United States, where there is plenty of Indian corn, turnips are not much raised excepting for table use.

What are ruta bagas ?

A large, coarse kind of turnips, sometimes called Swedish turnips because they are much raised in Sweden.

Where did the parsnip come from ?

It was brought to this country from Europe. It grows wild in the southern parts of Europe and of Asia.

Do not its roots make good food both for man and cattle ?

Yes ; it is much liked by some when boiled or fried ; and the butter of cows fed on pars-

nips is better than that made by other kinds of winter food.

Is not the carrot also a valuable food for horses and cattle ?

Yes ; and it is also put into soups and stews, and eaten boiled, and in Germany carrots are cut up and roasted and made into a drink to take the place of coffee.

What is parsley ?

A common garden plant, whose leaves are much used for seasoning soups and for dressing dishes.

Does it grow in the United States ?

It was first brought here from the south of Europe, but now grows well almost everywhere.

What are gourds ?

The name of a family or class of plants to which belong the common gourd, the pumpkin, squash, melon, cucumber, and others.

What is the common gourd ?

A vine which bears a fruit shaped like a water-bottle, the rind of which is very hard when dry. When the inside is scooped out these gourds make good bottles and dippers.

Do they not grow wild in Asia and Africa ?

Yes ; but they grow well in almost any warm country. Many are raised in the Southern States, where they are often called calabashes.

Is not the pumpkin also a vine ?

Yes ; and it sometimes grows twice as long as a man. It bears a bright yellow, bell-shaped flower ; the fruit is dark green at first, but turns golden yellow when ripe.

What are pumpkins mostly used for ?

For feeding cattle. In New England pies are made out of them ; but some kinds of squashes are thought to be the best for pies by most people.

Where did pumpkins first come from ?

Some think they were first brought from Asia, but others that the Indians raised them in this country before the whites came.

Did not the American Indians have squashes also ?

Yes ; they raised small squashes, but the best kinds were brought to this country from Europe.

What did the Indians call the squash ?

Askuta-squash (vine-apple), and from this has come our word squash.

How many kinds of melons are there ?

Two principal kinds, muskmelons and watermelons, but there are many different kinds of each of these. Among the muskmelons are the citron, cantaloupe, nutmeg, and pineapple melons ; and among the watermelons are the Spanish, Carolina, orange, and apple-seeded melons.

Is there not also a citron watermelon ?

Yes; it is used for making sweetmeats, and its rind or skin for making sweet pickles.

Where did melons first come from ?

They are supposed to have first grown in southern Asia, but they are now raised in most warm countries.

Did not the cucumber also first come from Asia ?

Yes; it grows wild there. The wild cucumber is very bitter, and it has become fit for food only by long cultivation.

What are gherkins ?

Young cucumbers pickled are called by this name in Europe, but they are generally called pickles here. In Europe cucumbers are eaten cooked in different ways, but in the United States they are generally eaten only as a salad.

Are not other vegetables often made into pickles ?

Yes; especially onions, cabbage, cauliflower, string-beans, and beets.

What is chow-chow ?

A mixture of different kinds of pickles. The word chow-chow is Chinese, and means mixed.

What are capers ?

The pickled flower-buds of the caper-shrub, much used in making sauces. The caper-shrub grows mostly in the south of Europe, especially in France, Italy, and Sicily.

Did not the onion also come from Asia ?

Yes ; but it now grows almost all over the world. It is a very healthful food, is much used as a seasoning for soups and other dishes, and is also eaten both raw and cooked. In Spain and Portugal a raw onion is often eaten like an apple, or sliced and eaten on bread.

Where do we get our onions from ?

Early onions are brought from the Bermuda Islands, and the later kinds mostly from New England.

Is not the leek a kind of onion ?

Yes ; but its flavor is milder than that of the onion. It is much used in cooking, especially by the Welsh.

What is garlic ?

A small kind of onion, with a strong taste and rank smell, much used for seasoning food, especially in Spain, France, and Italy. Each bulb is made up of several small bulbs, called cloves.

Is not a strong cement made from the juice of garlic ?

Yes ; it is much used for mending broken glass and china. The juice is also used as a medicine.

What is the shallot ?

A kind of garlic, but milder in taste. It is said to have been first brought to Europe by

the crusaders from Ascalon, a town in Palestine, from which the Spaniards called it *escalona*. This was made in English into *eschalot*, which finally became shortened into shallot.

What are chives or cives ?

A kind of small onions growing in clusters; the leaves are used for flavoring soups and other dishes.

Where did the cabbage come from ?

It was brought to this country from Europe. Wild cabbages grow in many parts of Europe, but they have no heads; the heads have been made by long cultivation.

Is the cabbage worth much for food ?

No ; more than nine tenths of it is water.

Are not great quantities of cabbage eaten in Germany ?

Yes, made into sauer-kraut. The cabbage is sliced up into shreds and packed with salt in a barrel, and left until it ferments, or works, when it is ready for use.

Is not the cauliflower a kind of cabbage ?

Yes ; as are also the plants called broccoli, kale, and savoy.

What is lettuce ?

A common plant the leaves of which are much used for salad. There are many kinds, divided into two different sorts, cabbage-lettuce, which grows in heads like a cabbage,

and cos-lettuce, which does not form heads. Lettuce is easy to digest, but is not worth much for food.

Was there any asparagus in America before it was settled by white men ?

No ; it was brought here from Europe, where, and in western Asia, it still grows wild. The Greeks and Romans made great use of it for the table, but it was not eaten in England until about the time of Charles I.

Are there not two kinds of artichokes ?

Yes ; the artichoke first known is a plant something like a thistle, and is thought to have come from Asia. The part eaten are the scales of the green flower-buds, which are boiled. The Jerusalem artichoke is a kind of sun-flower, and first came from Brazil. The root, which is the part eaten, is cooked like the potato, or cut up raw with vinegar and salt.

Why is it called Jerusalem artichoke ?

Jerusalem comes from *girasole*, the Italian word for sun-flower, which has been thus changed in turning it into English.

Where did the bean-plant first come from ?

It is supposed that it was brought from the East, but it has been grown in Europe from the most ancient times, and wild beans are found also in this country.

Are there not many kinds of beans ?

Yes; of different shapes, sizes, and colors, some of which grow on vines and some on bushy shrubs.

Is not the bean a very strong food ?

Yes; stronger even than wheat.

Is the Lima bean like the common bean ?

No; it is a different kind of plant from the common bean; it belongs to the same family of plants with the haricot, or French kidney-bean.

Was not the pea brought to this country by the early settlers ?

Yes; there were no peas here before the whites came, but now more than fifty kinds are grown.

What are split peas ?

Dried field-peas split in two by having the outer shell rubbed off in a machine. Split peas are much used in making soups, and in some countries they are ground into meal and made into cakes.

Are not peas valuable for food ?

Yes; they are more than half starch.

Is not the peanut sometimes called ground-nut or ground-pea ?

Yes; because its pods, which grow something like those of the pea, are ripened in the ground.

Is not the peanut-plant a vine ?

Yes ; a running vine which bears yellow flowers. After the flowers fall the flower-stem grows longer, bends downward, and the pod on the end forces itself into the ground.

How are the peanuts got ?

The ground is dug up with large forks which take up the vines with the peanuts on. The vines are dried for a few days, when the peanuts are picked off and packed in bags for market.

Where are peanuts mostly raised ?

On the west coast of Africa, in South America, and in the Southern United States.

What are their uses ?

In Africa and South America they form one of the principal articles of food, and great quantities of them are pressed for their oil.

What is the oil like ?

It is much like olive-oil, and is used in the same way. It is also largely made into soap.

Is not the tomato an American plant ?

Yes ; it first grew in the warm parts of America, but it is now cultivated in all parts of the world where the climate is mild enough.

What were tomatoes called in old times ?

Love-apples ; and they were grown in gardens as curiosities.

Are they not now an important food ?

Yes; they are eaten both raw and cooked ; they are also pickled and preserved, and made into catsup. Great quantities are put up in tin cans every year for winter use.

Where do our earliest tomatoes come from ?

From the Bermuda Islands.

What is catsup, or ketchup ?

A kind of sauce made from tomatoes, mushrooms, and other things, used as a relish on meats and fish.

What are mushrooms ?

A kind of fungi or flowerless plants found growing wild in fields, and often raised in cellars and caves.

Is not the mushroom something like the common toadstool ?

Yes; it has a white, thick stem, with a fleshy cap, white above and pink underneath. The toadstool is a poisonous kind of mushroom.

What are mushrooms mostly used for ?

They are eaten either stewed, broiled, or baked, or are used as a flavor for other dishes.

What are truffles ?

A kind of fungi which grow underground like potatoes. They are generally about the size of a walnut, but some are much larger.

What is their color ?

Some are nearly white, but most of them are brownish, and rough or warty on the outside.

How are they found ?

In England they are hunted with trained dogs, which find the places where they grow by the smell, and point them out as a pointer dog does game. The truffle is then dug up, and the dog is rewarded with something to eat.

Do they not hunt truffles in the same way in France ?

Yes ; and they also train pigs to find them.

Are there any truffles in the United States ?

None have yet been found growing here, but many are brought here in sealed tin cans, to be used in flavoring meats and sauces.

What are lichens ?

A kind of plants without separate stems or leaves, which grow on rocks, on the bark of trees, on earth, etc. They are sometimes wrongly called rock-moss and tree-moss, but real mosses have separate stems and leaves.

Are not lichens very useful to man ?

Yes ; some kinds are used for food and for medicine, and from others are got rich dye-stuffs, such as archil or cudbear, which make red, purple, violet, and lilac dyes for coloring silk. The purple dye called litmus is made from archil.

What is Iceland moss ?

A lichen which grows in Iceland and other cold countries. It makes good food for cattle, sheep, swine, and deer, and the Icelanders make both bread and soup of it. Iceland moss is used here for making blanc-mange.

What are seaweeds ?

Plants growing wholly in water, fresh or salt. Some kinds are found only in fresh water, some only in salt water, and some in both.

Are not many seaweeds very useful to man ?

Yes ; some are dried for fuel, and put on land for manure : some are used for stuffing cushions and mattresses, and for packing goods ; and some for food both for men and beasts. In China a kind of seaweed is made into glue and varnish ; and the edible bird's-nest, so much prized by the Chinese, is said to be built by swallows out of a sticky kind of seaweed.

What is Irish moss, or carrageen ?

A seaweed much used instead of isinglass in making blanc-mange and jellies, and also in making lager-bier. It is bright green when gathered, but is bleached white by wetting it with sea-water and drying it.

Is not a good deal of it collected in this country ?

Yes ; about five thousand barrels are

gathered every year on the coast of Massachusetts, and sent to New York and Philadelphia.

What is dulse?

A kind of purple seaweed, also used for food.

Were there any apples in America before the whites came?

No; the English settlers brought the first apple-trees, which grew so well that they are now plentiful all over the United States.

Are not American apples now sent to Europe?

Yes; large quantities are sent there, and also to China and India.

Is not cider made from apples?

Yes; by squeezing the juice out and letting it ferment. Cider brandy, sometimes called apple brandy, is made by distilling cider in a still.

What are crab-apples?

Small apples, not much larger than plums, much used for making preserves. It is supposed that all the kinds of apples now known have grown from the wild crab-apple tree.

Did not the early settlers also bring the pear with them to this country?

Yes; the pear-tree grows wild in Europe and Asia, but none grew in America before the English came.

Is the wild pear good to eat?

No; the tree is only a shrub with thorns, and the fruit is small and bitterish.

Are there not now many kinds of pears in the United States?

Yes; more than a thousand kinds, but only a few kinds are raised for market. Among the best are the Bartlett, which is an English pear, and the Seckel, which first grew in this country.

Is not a kind of cider made from the juice of pears?

Yes; it is called perry.

What is the wood of the pear-tree used for?

It is used by turners and by engravers for coarse work, and it is sometimes dyed black and used by cabinet-makers as a false ebony.

What did the ancient Romans call the quince?

Cydonia; from the town of Cydonia, in Crete, which was noted for its quinces.

What are quinces mostly used for?

They are not good to eat raw, so they are made into tarts, marmalade, and jelly. A drink, something like cider, is also made from their juice.

Was not the peach first brought from Persia?

Yes; and the Romans called it *malum Persicum*, Persian apple. It is called in Italian *persica*, in French *pêche*, and out of this has grown our word peach.

What is the difference between the peach and the nectarine?

The peach has a rough skin and the nectarine a smooth skin; the nectarine is therefore only a smooth-skinned peach.

Where do most of our peaches come from?

From Delaware, Maryland, Virginia, and New Jersey, where great numbers are raised and sent to market, packed in baskets and crates.

Are not many peaches also preserved every year?

Yes; both by drying and by putting them up in tin cans, which are sealed tight so that no air can get in.

How are dried peaches made?

By slicing them and drying them in the sun or in rooms heated by stoves. Those dried in the sun are darker in color and not so good as those dried by stove heat.

Is not a kind of brandy made from peaches?

Yes; by pressing out the juice, letting it ferment, and distilling it in a still.

Are not other fruits also much like the peach?

The apricot looks like a peach, but has the stone of a plum.

Where did the apricot first come from?

It grew first in the East, and was brought into Europe in the time of Alexander the Great.

Are not many apricots dried ?

Yes; especially in Italy, and sent to foreign countries. In Bokhara and other parts of the East great numbers are also dried, and sent mostly to Russia. The dried apricots which come from France, packed with sugar in paper boxes, are the fruit of the apricot plum.

Where did the plum-tree first come from ?

It is not known, for wild kinds grow both in the United States and in Europe.

Is there not a kind which grows in the sands of the seashore, along the Atlantic coast of the United States ?

Yes; the purple beach-plum. It is small and bitter, but makes good preserves.

What is the damson plum ?

A small black plum which gets its name from Damascus, from which place it is supposed to have first come.

Are not prunes made from plums ?

Yes; they are only dried plums. The best come from France; but those used in cooking come mostly from European Turkey. These have a smoky taste, from being dried over wood fires.

Where did the cherry first come from ?

It is said that the Romans first brought this fruit from Cerasus, in Asia Minor; on this account they called it *cerasus*, and from this has come our word cherry.

Are there not now many kinds of cherries?

More than three hundred kinds are now known, of many different shades of color, from light pink to black.

What is the wild-cherry tree of the United States?

One of the largest of our forest trees, which bears a small black fruit growing in clusters like currants. As it is somewhat bitter, it is used mostly for flavoring liquors.

Is not the wood of this tree also very useful?

Yes; it is fine and close-grained, and has a reddish color which grows darker with age. It is much used for furniture, being often dyed black to look like ebony. The black keys of pianos are generally made of it.

Did not the orange come from Asia?

Yes; it was brought to Europe from India, where it grows wild, but it is now raised in almost all warm countries. The Spaniards first planted the tree in America, and it is now so plentiful that great quantities of fruit are sent from the West Indies.

Where do most of the oranges used in the United States come from?

From Sicily, Spain, and the West Indies. Many fine oranges are now raised in Florida and California.

Is not the lemon-tree much like the orange-tree?

Yes; it belongs to the same family or class of trees. It also grows wild in India, and was brought to America by the Spaniards.

Where are lemons mostly brought from ?

Most of those sold here come from Sicily, but some are brought from Valentia, in Spain.

Where do limes come from ?

All our limes are brought from the West Indies. It is not known where the lime-tree first grew, but it is supposed by some that it has always grown in the West Indies.

What other fruits belong to the same family or class with the orange, lemon, and lime ?

The citron and shaddock.

Is not the citron much like the lemon ?

Yes; but it is larger and has a rougher skin. It is not so sour as the lemon, but its juice is used in the same way. The peel preserved in sugar makes citron preserves.

What is the shaddock ?

A fruit something like the orange, but nearly as large as a child's head. It is not worth much for eating, but makes good preserves.

Where do shaddocks come from ?

Those sold in our markets are brought from the West Indies. The fruit grows wild in China and the East Indies, and the tree was first carried to the West Indies by Captain Shaddock, an Englishman, from whom it gets its name.

What are mangoes ?

Those seen in this country are the pickled

green fruit of the mango-tree, which grows in India. This is orange-colored when ripe, is about as large as a goose-egg, and has in it a large flattened stone with a sweet pulp around it.

Does not the tree grow also in the West Indies ?

Yes ; and the fruit is sometimes made there into sweetmeats, but the pickled mangoes come mostly from the East Indies.

Where do figs come from ?

Those sold in this country are brought mostly from Smyrna, in Asia Minor, where they are dried and pressed into boxes. The fig-tree grows wild in Asia and North Africa.

Do not figs also grow in this country ?

Yes ; in some of the Southern States they will ripen in the open air, but in the Middle and Northern States they can be raised only in hot-houses.

What are dates ?

The fruit of a kind of palm-tree which grows in North Africa, Arabia, and Persia.

Is not the date-palm a very useful tree ?

It is one of the most useful trees in the world ; its trunk makes wood for houses, fences, and fuel ; its leaves are made into baskets, bags, mats, fans, brushes, ropes, and cords ; and its fruit gives food to millions of people.

Is not the fruit eaten both fresh and dried ?

Yes ; when dried it is usually pounded together into a mass, and it is this which makes the chief food of the caravans which cross the great desert of Sahara.

Does not the tamarind-tree grow wild in many parts of Asia and Africa ?

Yes ; but it is now grown in the West Indies and in South America.

How does the fruit grow ?

The fruit is a pod five or six inches long, and as thick as a man's finger, having in it a row of seeds in a sour juicy pulp. The pods are picked when ripe, and the fruit is shelled out, packed into casks, and covered with boiling syrup.

Does not the pineapple belong in South America ?

Yes ; it first grew there, but it is now found in most hot countries. It is a plant with long, stiff, sharp-pointed leaves, from the middle of which grows a short stem bearing a single fruit.

Is not a kind of cloth made from threads in the leaves of the pineapple plant ?

Yes ; it is largely made in the Philippine Islands. Cordage and nets are also made from these threads.

Where did the banana first grow ?

It is not exactly known, but some think it

was brought from the East Indies to America by the Spaniards.

Are not the banana and the plantain much alike?

Yes; they are only different kinds of the same fruit. Plantains are coarser than bananas, and are used mostly for cooking, while bananas are commonly eaten raw.

Is not the banana a very valuable food?

Yes; a piece of ground of a size to grow enough wheat to feed one man will, if planted with bananas, raise food enough for twenty-five men. The young leaves of the plant are also eaten as greens, and a kind of grass-cloth is made from the thready part of the leaves.

Where does the pomegranate grow?

It grows wild in southern Asia, but it is now raised in many warm countries. Very fine ones grow in the southern parts of the United States, and in Mexico and South America.

What kind of fruit does it bear?

It is about the size of a large orange, and has a thick leathery skin of a deep orange color tinged with red. The inside pulp and the seeds are the parts eaten.

Are not the rind of the fruit and the bark of the tree also useful?

Yes; they are used in tanning morocco leather.

Where are raisins mostly brought from ?

From Malaga and Valentia, in Spain. A few are now sent also from California.

Are not some brought from Smyrna ?

Yes ; a kind called Sultana raisins, which have no seeds.

Are not Zante currants also a kind of raisins ?

Yes ; they are made from a grape about as large as a pea, which grows in the island of Zante and in other Greek islands.

Why, then, are they called currants ?

In old times they were called corinths, because many of them grew near Corinth, and this at last became changed to currant.

What does the word raisin mean ?

It is the French name for the grape.

Do not grapes grow almost all over the world ?

Yes ; in all mild climates. There are several wild kinds in this country ; and the kinds now grown in gardens, such as the Işabella, Catawba, and others, are supposed to have all come from them.

Are not American grapes different from those which grow in Europe ?

Yes ; in all American grapes the soft pulp will easily slip out of the skin, but European grapes can be broken open right through the pulp, so that the seeds can be picked out.

Are not foreign grapes also grown in this country ?

Yes ; in cold graperies covered with glass,

or in hot-houses; but in California they grow well out of doors.

What are grapes mostly raised for?

For making wine; though many kinds are used for eating, and for making raisins.

What are the principal wine-making countries?

France, Italy, Spain, Portugal, and Germany.

Are not different kinds of wine made in different countries?

Yes; but the nature of the wine depends not only on the kind of grapes and the place where they grow, but also on the time when they are picked and the way the wine is made. Thus, for making champagne, the grapes are picked before they are quite ripe; for port, they are picked when ripe; and for sour wines, like Rhine-wine, the picking is put off as long as possible.

Is not the juice of all grapes white?

Yes; and all kinds of wine would be white if they were made of juice alone; but when the juice and the skins are left to ferment or work together, the wine will be colored by the skins. Even the skins of white grapes will color wine some, while those of dark grapes give the rich tints seen in claret and port wine.

What are the principal French wines?

Champagne, Burgundy, Médoc, and Bordeaux.

Are not Malaga and sherry Spanish wines ?

Yes; sherry is named from Xeres, near which place it is mostly made.

Whence does Port-wine derive its name ?

From Oporto, in Portugal, from which place most of it is sent.

Is not Madeira also a Portuguese wine ?

Yes; it is made in the Portuguese island of Madeira, off the west coast of Africa.

Do not Rhine and Moselle wines come from Germany ?

Yes; and Tokay comes from Hungary.

What is the difference between sweet wines and dry wines ?

Sweet wines are those which have much sugar in them, and dry wines those which have but little sugar.

What is the difference between sparkling wines and still wines ?

Sparkling wines are those which foam when the bottle is uncorked, and still wines are those which do not foam.

What are olives ?

The fruit of an evergreen tree supposed to have first come from western Asia, but which is now largely raised in all the countries around the Mediterranean.

Are not some grown in this country ?

Yes, in California; and some also in Mexico and South America.

Are olives ever eaten as fruit ?

No; they are too bitter; they are either made into pickles or pressed for their oil.

How are olive pickles made ?

The fruit is picked when green, and soaked in strong ley or in lime-water, which softens it and makes it milder in taste. It is then soaked in water for a few days, and lastly put into jars or bottles, covered with salt and water seasoned with cloves and other spices, and sealed up. A common kind of olives are packed in small wooden kegs.

How is olive oil made ?

The fruit, which is left on the trees till nearly ripe, is ground to a pulp, put into coarse bags and pressed. The oil runs into a cistern of water, on the top of which it floats, and from which it is dipped out.

What is olive oil used for ?

In Europe it is largely used in cooking, and is eaten instead of butter, but in this country it is mostly used to dress salads.

Is not soap also made from it ?

Yes; in Spain, and in other countries where the tree grows, the oil is made into Castile and other soaps.

Does not the strawberry grow wild in almost all parts of the United States ?

Yes, and in most other mild climates. The

kinds grown in gardens were got by planting the seeds of the wild strawberry.

Is it known why it is named strawberry?

No; some think it was first called stray-berry, from the straying of its vine, and that the name became changed in time.

Does the raspberry grow wild in this country?

Yes; there are several wild kinds, some of which are red and some black, but the large red raspberry called the Antwerp raspberry was brought from Europe.

What is the raspberry-bush rightly named?

The bramble; and it belongs to the same family or class with the blackberry. In England the blackberry is commonly called the braimbleberry.

Does not the blackberry grow in almost all parts of Europe and Asia?

Yes, and in most parts of North America. In the United States are found the high-bush blackberry, the low-bush blackberry, and the dewberry; and there are also several kinds grown in gardens, among which are those called the Lawton and the Wilson.

Where did the huckleberry get its name from?

In old times in England it was called hart-berry, because it was eaten by the hart or stag; and this became changed into hurtle-berry or whortleberry, and finally into huckle-berry.

Are there not several kinds ?

Yes; the principal kinds are the common black huckleberry, the dwarf blueberry, and the swamp blueberry. The bilberry, called in Scotland blaeberry, is the same as the swamp blueberry.

Why is the gooseberry so called ?

It is rightly gorseberry, and it is so called because it has prickles like the shrub called gorse.

Does it not grow wild in the United States ?

Yes; and the kinds grown in gardens were first raised from the seed of wild ones.

Does not the currant belong to the same family or class of fruits with the gooseberry ?

Yes; and like it, it grows best in cool countries. There are several kinds in the United States, some of which are red, some white, and some black; and in Russia there is a bright yellow kind.

Is it not commonly said that the currant gets its name from Corinth, in Greece ?

Yes; because it has been mixed up by most writers with the small raisin called the Zante currant; but it is rightly called "curran" and not currant, and it gets its name from an old British word meaning red.

Does not the cranberry get its name from the same word ?

Yes; and cranberry rightly means the red berry.

Where do cranberries grow?

Mostly in cool climates, in the northern parts of Europe, Asia, and America, and in damp places. There are large cranberry swamps in Massachusetts and New Jersey.

What are barberries?

The fruit of a shrub which grows wild in the northern parts of Europe and Asia, and in many parts of the United States. Its berries, which are about the shape and size of grains of wheat and bright red, are so sour that birds will not eat them.

What are they used for?

They make a pleasant drink, and good preserves and jelly.

Has not the barberry-shrub other uses?

Yes; its bark is used for tanning, and its bark and roots make a fine yellow dye for leather.

What is sugar made from?

The juice of the sugar-cane, a kind of grass which looks much like Indian corn.

Are there not different kinds of sugar-cane?

Yes; there are many kinds with stalks of different colors, some being green, some yellow, some purple, and some purple and yellow striped.

Does it not grow very tall?

Yes; sometimes three times as high as a man, but commonly only once or twice as

high. It has a hard and solid stem which grows in joints, and long pointed leaves which hang over like Indian-corn leaves.

Where did sugar-cane first grow ?

In India, it is supposed, as sugar was first made there.

Who brought it from India ?

It was carried from India to Spain by the Arabs. The Spaniards took it with them to the West Indies, and from there it was carried to Louisiana about 1751. It is now raised in several of the Southern States.

Must sugar-cane be planted every year, like corn ?

No ; in very hot countries it is planted only about once in ten years, but in this country it has to be planted every two or three years.

Is it raised from the seed ?

No ; pieces of the cane are cut and planted, and new canes sprout from each joint.

How is sugar made from the cane ?

As soon as the canes are ripe, which is usually in August, they are cut and ground in a mill, where they are crushed between iron rollers, which squeeze out all their juice. The juice is then boiled down slowly in large copper pans until most of the water is driven off as steam, when it is poured into great wooden coolers in which it cools very slowly.

Does it become sugar when it cools?

Partly; the sugar forms in a soft mass in the middle, all the rest being molasses. The whole is then poured into hogsheads with holes in their bottoms, which are set upon frames over a large vat, or kind of tub; and into this the molasses is let drip for five or six weeks, when the sugar will be dry enough to be packed in boxes and barrels.

Is not the sugar thus made common brown sugar?

Yes; it is sometimes called raw, or muscovado, sugar, from a Spanish word meaning unrefined. It is usually refined before it is used.

What do you mean by refined?

Made into white sugar such as we use on the table. This is sometimes done on the plantations, but it is generally done in the northern United States or in England.

How is the color taken out of it?

By melting the sugar in hot water and straining it through animal charcoal or bone black. It is then boiled down again in close covered pans, until the water is driven off, when it turns into sugar again, and this time perfectly white.

Is it then made into different forms?

Yes; when drained in moulds it becomes loaf-sugar, but when it is whirled round very

fast in a machine which separates it quickly from the syrup it is called granulated sugar. Loaf-sugar is sometimes sold in loaves and sometimes cut up into square lumps, crushed into small pieces, or ground to powder.

What is done with the syrup which drips from refined sugar?

It is sold under different names, such as sugar-house syrup, golden drips, etc. In England it is called treacle.

What is candy made of?

Mostly of boiled sugar mixed with many other things, such as the syrups and juices of fruits, berries, nuts, and seeds. Different kinds of gums and colors are also used.

Are not the colors in candies sometimes unhealthful?

Yes; because they are made from poisonous substances. The most dangerous colors are yellow and orange; and the bright reds and greens are not always safe to eat. In buying candy, pick out those kinds which are not bright colored.

Are white candies always safe to eat?

No; the cheap kinds often have chalk, plaster of Paris, and pipe-clay in them; and although these things are not really poisonous, they are not healthful to eat, and often lead to illness.

Does not the making of candy need a great deal of skill?

Yes; and only the best workmen can make all kinds.

Is not coffee the seed of a tree?

Yes; the coffee tree or shrub, which grows wild in Africa and Asia, is sometimes four or five times as high as a man, but it is usually kept down by cutting to a height a little lower than a man, so that the berries can be easily picked.

Is it not an evergreen?

Yes; the leaves never change, and the shrub blossoms and bears fruit almost all the time; but the seeds are gathered only two or three times a year.

How do the seeds grow?

The fruit of the tree looks like a cherry, and is sweet and good to eat. Each one has in it two seeds or coffee-beans, which lie with their flat sides to each other and are held together by a tough skin. When ripe, the fruit is gathered and dried, and then rolled under wooden rollers which break the outside and the tough skin and let out the seeds.

How long has coffee been known?

It is said to have been used in Persia about a thousand years ago, but it has been known in Europe only about three hundred years.

The first coffee-plant in America was brought from the East Indies about 1725 by a French captain, and planted in the West Indies; and from it have come most of the coffee-plants growing in America.

What are now the principal countries where coffee is grown?

Brazil, Java, Sumatra, India, Ceylon, Arabia, Abyssinia, Central America, the West Indies, Venezuela, Colombia, and Peru. More than half the coffee used in the world comes from Brazil.

Where is coffee supposed to have first come from?

From Kaffa, in Abyssinia, from which country it got its name.

What is chicory?

A plant belonging to the same family or class of plants with the dandelion. Its roots are dried, roasted, and ground, and used either for coffee or mixed with coffee.

Is it not harmful to use?

Yes; when much used it makes those who drink it nervous.

Where does tea mostly come from?

Most of it comes from China, but a good deal is sent from Japan and India, and some from Java.

Are there not many kinds of tea?

Yes; but all are supposed to have come from one kind of plant.

How, then, are the different kinds of tea made ?

By the different soils and climates in which the plants grow, by the different times of picking the leaves, and the different ways in which they are cured.

Is not the tea-plant also an evergreen ?

Yes, of about the same size as the coffee-shrub, and it is kept cut down in much the same way. The leaves are usually picked four times a year, the first picking being the best, and the last the poorest.

Are there not two kinds of teas, black and green ?

Yes; but they are made from the same leaves. When the leaves are dried quickly they make green tea, but when they are dried slowly they ferment or work a little and turn black, and thus make black tea.

Do not the Chinese sometimes color their teas ?

Yes; but only those which they send to foreign countries.

Is not tea the common drink of the people in China and Japan ?

Yes; there are tea-houses where it is sold in all the towns, and along all the roads. The tea is drunk clear, without milk or sugar.

What is cocoa ?

A paste made of the seeds of the cacao-tree. The tree, which grows in Central and South America, and in the West Indies, is an

evergreen three or four times as high as a man. Its fruit, which is like a thick short cucumber, has in it a pinkish-white pulp, good to eat, and twenty to sixty seeds called cocoa-beans.

What are the beans like ?

They are about as large as almonds, and have a thin reddish-brown shell and a dark brown, oily inside.

How are they prepared for use ?

The beans are first roasted like coffee, and then bruised and cleaned of their husks. The husks make what are called cocoa-shells, and the broken beans cocoa-nibs. The paste made by grinding the nibs alone is rightly cocoa, and when other things, such as sugar, honey, spices, and flavors, are mixed with it, it is called chocolate.

Is not broma also made out of cocoa ?

Yes; after the oil has been pressed out of it, the flour which is left is made into broma, which is thus not so rich as chocolate.

What is done with the oil ?

The oil, which is called butter of cacao, is made into soap, candles, pomades, and ointments.

What is cinnamon ?

The inner bark of a tree which grows in Asia and in South America. The best comes

from Ceylon. The branches of the tree are cut, the outer bark scraped off, and the inner bark peeled off with a knife. The pieces, when dried in the sun, curl up into little rolls.

What is oil of cinnamon made from ?

The leaves and fruit of the tree.

Where do cloves come from ?

The best are brought from the Molucca Islands, in the Indian Archipelago, but many are raised also in Sumatra, Zanzibar, the West Indies, and Brazil.

Is not the clove-tree an evergreen ?

Yes; it is a kind of myrtle which grows four or five times as high as a man. The cloves are the flower-buds, which are picked before they begin to open, and dried in the shade.

What do the Dutch call cloves ?

Nail-spice; they look like little nails. The English word clove is made from the Latin *clavus*, which means a nail.

Where do nutmegs grow ?

In the East and West Indies, and in South America.

Is not the fruit of the nutmeg-tree much like a round pear ?

Yes; when ripe it is golden yellow, and has a hard fleshy part, which is made into

sweetmeats. Inside this is the nut, in a thin brown shell, with a bright red network around it.

Is not this network valuable?

Yes; when dried in the sun and pressed it turns yellow and becomes the spice called mace.

Is oil of mace made from it?

No; oil of mace is made by pressing nutmegs.

What does the word nutmeg mean?

Musk-nut. In old times in England it was used as a perfume, and ladies used to wear nutmegs, set in silver and ornamented with precious stones, hanging from their belts as scent-bottles are worn now.

Where does ginger grow?

Ginger grew first in Asia, but it is now largely raised in the West Indies. It is a plant with a root about as large as a man's finger.

Is the spice called ginger made from these roots?

Yes; and the young tender roots are made into a preserve by boiling them in sugar.

What is pepper?

A spice made from the dried berries of a climbing shrub which grows wild in the East Indies, but is now raised in many hot countries.

What are the berries like ?

They grow in clusters of twenty or thirty, something like a bunch of currants. They are first green, then turn red, and then yellow ; when dried they become black and wrinkled.

Do not black and white pepper come from the same berries ?

Yes ; black pepper is made by grinding the berries simply dried, but for making white pepper the berries are soaked in water and the outer shell rubbed off before grinding. White pepper is weaker than black, because much of the strength of pepper lies in the outer husk.

What is red or Cayenne pepper ?

It is made from the pod of the capsicum-plant, which was first brought from Cayenne, in South America.

Is it not wholly different from the pepper-plant ?

Yes ; it bears a large pod, which is green at first, but bright orange or scarlet when ripe. Green capsicum-pods are used for pickling, and dry ones are ground for pepper.

What is allspice ?

The berry of the pimento-tree ; so called because it is supposed to have the flavor of cloves, nutmegs, and cinnamon.

Is it not sometimes called Jamaica pepper ?

Yes, because much of it comes from that island ; but it is also raised in other West India islands and in South America.

What is mustard ?

A seasoning made from the bruised seeds of the mustard plant or shrub.

Does it grow in this country ?

Yes ; but it was first brought here from Europe. There are two kinds: white mustard, which bears yellow seeds, and black mustard, which has black seeds. Both kinds are used in making table mustard.

What is anise-seed ?

The seed of a plant which grows wild in Europe and North Africa. It is used for flavoring candies and for making cordials.

Does not the caraway-plant also grow wild in Europe ?

Yes ; and it is much grown in gardens in Germany and England. Its seeds are used to flavor liquors, candy, cakes, bread, and other things.

Where do cardamom-seeds come from ?

They are the seeds of a plant which grows in India. In that country they are put into soups and other foods, but here they are used mostly as a medicine.

What is vanilla ?

The common name of the fruit of a Mexi-

can plant. The plant is a kind of vine which grows on trees and lives on air. It bears slender pods about eight inches long, which have a pulpy inside filled with small black, oily seeds. When dry the pods and seeds are ground up with sugar and mixed with weak alcohol. The extract of vanilla thus made is used for flavoring ice-cream, candies, cake, and other things.

Did not the Mexicans use vanilla before Columbus came to America ?

Yes; they ground the seeds up with chocolate to flavor it, and it is still used in the same way.

What is turmeric ?

The ground roots of an East Indian plant, something like ginger. The roots are orange yellow inside, and have a spicy taste.

What are its uses ?

The East Indians use it to season curry, but in other countries it is principally used to color varnishes and to dye silks and woollens.

What is aloes ?

A bitter drug, the dried juice of the leaves of the aloë-tree. There are several kinds of the tree, which grow in Asia, Africa, and the West Indies. The best aloes comes from the island of Socotra, in the Indian Ocean, near the mouth of the Red Sea.

What is opium ?

The dried juice of the white poppy.

Where does this poppy grow ?

It grows wild in Asia, and it is raised for its opium in India, Persia, Arabia, Egypt, and Asia Minor. In Europe and in the United States it may often be seen in gardens.

How is opium made from it ?

A few days after the flowers have fallen, men go through the fields in the afternoon and make little cuts in all the poppy-heads. A milky juice oozes out and dries into a soft brown sticky paste, which is scraped off every morning and put into jars.

What are the uses of opium ?

In China it is largely used for smoking with tobacco, but in other countries it is used mostly as a medicine, in the form of laudanum and paregoric.

What is the difference between laudanum and paregoric ?

Laudanum is only opium dissolved in alcohol ; paregoric is made up of opium, camphor, honey, alcohol, and other things.

Is not opium valuable as a medicine ?

Yes, because it has the power of putting one to sleep and taking away pain ; but it is dangerous to take too much, as one might be put into so deep a sleep as to be unable to wake again.

What is tobacco?

The dried leaves of the tobacco-plant.

When was tobacco first seen by white men?

When Columbus landed in Santo Domingo, in 1492, he found the Indians smoking the leaves of this plant, which they grew for this use.

Did not the Spaniards soon learn to smoke?

Yes; and the plant, carried by them to Europe, is now cultivated in warm and mild countries all over the world.

How does tobacco grow?

The plant is commonly about half as tall as a man, with large, broad, pointed leaves, from the middle of which grows a stalk bearing a cluster of purplish-pink flowers.

Is not the flower-bud generally broken off?

Yes; only tobacco meant for seed is allowed to blossom.

How is tobacco dried or cured?

When fully grown the plant is cut off just above the ground and hung up to dry, head downward, in buildings open at the sides, so that the air can pass through. After about three months the leaves are pulled off and packed in boxes or casks for sale.

What are made from tobacco-leaves?

Cigars, chewing and smoking tobacco, and snuff.

Where are the best cigars made?

In Havana, from tobacco raised in the island of Cuba; but many of the cigars called Havanas are made in the United States.

What are cheroots?

Cigars cut off square at each end. They are made in the East Indies, principally at Manila, in the Philippine Islands, whence they are often called Manilas.

What are cigarettes?

Small cigars made of chopped-up tobacco wrapped in thin paper. The Spanish name *cigarrito* means a little cigar. They are smoked much by Cuban and Spanish ladies.

How is snuff made?

By grinding tobacco-leaves to a fine powder. For some kinds of snuff the leaves are dried in kilns, and for others they are ground when moist. They are colored and flavored with different things.

Is not asafoetida a kind of gum?

Yes; the dried juice of a plant which grows in Persia and India. Cuts are made in the roots, and the milky juice which runs out is dried in the sun.

What are its uses?

In some parts of the East food is seasoned with it, but it is used mostly as a medicine.

Is not camphor also a gum ?

Yes; it is the hardened juice of several kinds of the laurel-tree.

Where do we get it from ?

Most of that brought to the United States comes from Japan and Formosa; but a good deal is got also in Sumatra and Borneo.

Is not Sumatra and Borneo camphor mostly sent to China ?

Yes; the Chinese believe it to be better than other kinds, and pay large prices for it. Camphor-wood trunks are supposed to be made out of the wood of the trees from which this kind of camphor comes.

What is myrrh ?

The hardened juice of several kinds of shrubs which grow in Arabia and Abyssinia. It has a sharp, bitter taste, and is used as a medicine and as a tooth-powder.

What is frankincense ?

A kind of gum, the dried juice of an East Indian tree. It was used by the ancients to burn in their temples to hide the smell of animals sacrificed, and it is still burned for incense in Roman Catholic churches.

Is not gamboge also a kind of gum ?

Yes; it is the hardened juice of a tree which grows in Siam, Cochin China, and Ceylon. It is used as a medicine, and as a yellow paint.

From what kind of tree does gum Arabic come?

From several kinds of acacia-trees which grow in Arabia, India, and Africa. Gum Senegal, from Senegal, in Africa, and Barbary gum, from Morocco, are much like it.

What are its uses?

It is used as a medicine, for stiffening muslins and silks, for making gum-drops, and for thickening inks and colors for calico-printing.

Is not gum tragacanth also used for stiffening cloths?

Yes, where gloss or shine is not wanted. This gum is the dried juice of the goat-thorn, and is brought mostly from Persia and Asia Minor.

What is India rubber?

The hardened juice of several kinds of trees which grow in Mexico, Central and South America, and the East Indies. It is also called caoutchouc, and sometimes gum elastic.

Where does most of the India rubber of trade come from?

From India and Brazil. The East Indian rubber is the juice of a kind of fig-tree which grows to a very large size. That from South America is the juice of the syringe-tree, which is also very large: it was so called by the Portuguese because the Indians used little bottles made of the gum to hold water,

with which they syringed out their mouths after eating.

Is not the dried gum of a grayish-white color ?

Yes; but that which comes from South America is dried over a wood-fire, and the smoke blackens it.

Why is it called India rubber ?

Because it was first brought from India, and was first used only for rubbing out pencil-marks.

Are not its uses now very numerous ?

Yes, more than those of almost any other article. All kinds of water-proof goods are made from it, and it is woven with silk, cotton, or woollen threads into many kinds of cloth. When vulcanized it has a great number of other uses.

What is vulcanized rubber ?

India rubber mixed with sulphur and heated very hot, when the two unite into a substance unlike common rubber in many things. It is more elastic or springy, and keeps its springiness better in very cold and in very hot weather.

What are made from vulcanized rubber ?

Boots and shoes, tubes, fire hose, gas-pipes, window and door springs, belts for machinery, mats, and many other things.

If vulcanized rubber is heated still hotter, what is made of it?

It turns into ebonite, or hard rubber, which is made into canes, combs, the backs of brushes, buttons, picture - frames, knife-handles, etc.

Is not India rubber also made into a hard shiny substance like jet?

Yes; it is made by heating rubber, sulphur, and coal-tar together. It can be cast in moulds or rolled out into sheets, and when cold may be cut and polished like stone. Jewelry, such as bracelets, breast-pins, sleeve-buttons, and watch-guards, and many other useful and ornamental things are made out of it.

Who found out how to vulcanize India rubber?

Charles Goodyear, an American, in the year 1839.

Is not gutta-percha also the dried juice of a tree?

Yes; of a tree which grows in the Malay Archipelago. The Malays cut down the tree, which is very large—often three feet thick—and scrape off all the juice between the wood and the bark; but sometimes they only bore a hole in the tree and catch the sap in gourds. As it hardens it is made into cakes or lumps, and sent to foreign countries.

Is not pure gutta-percha grayish white?

Yes; but it is usually very dirty, and has to be cleaned before it is fit for use.

How is it worked ?

It is cut up into small pieces, and made into a soft paste with hot water, when it may be rolled into sheets or pressed into any form. When it cools it will keep the shape given to it.

What are its uses ?

It is made into water-proof shoe-soles, water-pipes, inkstands, trays, and bottles and funnels for chemists to use with acids which will eat glass. Cloth for clothing is also sometimes coated with it, and telegraph-wires are covered with it.

What is copal ?

The resinous juice of trees which grow in Mexico, South America, the East Indies, and Africa. It is used for making fine varnish.

What is mastic ?

The gum of the mastic-plant, a shrub which grows around the Mediterranean. When mixed with oil of turpentine it makes a fine varnish much used on oil-paintings.

Do not the Turkish ladies chew it ?

Yes; because they think it sweetens the breath and preserves the teeth.

What is lac ?

A kind of resin found on several kinds of trees in the East Indies. It is made to run out of the tree by the stings of insects which

live on the sap. In time the twigs become covered with a thick coating, and people cut them off and get the lac by melting it in hot water. When purified it is dried on strips of wood, and is then called shell-lac.

What is shell-lac used for ?

For making sealing-wax, lacquer, and varnish. French polish, used on furniture, is made of shell-lac and alcohol.

Is not a fine red dye also made from lac ?

Yes; the bodies of the insects are colored purple-red by the sap which they eat, and this color is washed out when the lac is melted. When the water dries up the thick part is cut up into small cakes and sold as lac-dye. The red coats of British soldiers are dyed with this.

What is saffron ?

A yellow coloring matter got from the stigma, or centre part, of the flower of a kind of crocus.

Was it not once much used as a medicine ?

Yes; but it is now known to have no value as such, and is used mostly for coloring candy, cheese, and butter. It is brought chiefly from France, Spain, and Germany.

What is indigo ?

A blue coloring matter made from several kinds of plants, some of which grow in India

and Ceylon, some in China and Japan, some in Egypt, and some in the West Indies, and in Central and South America.

Are not the plants raised from the seed ?

Yes; the seed is planted every year.

How is the indigo made ?

The plants are cut when green, and soaked in water for nearly a day, when their juice colors the water light green. The green liquor is drawn off into another tub, a little lime-water is put in, and it is beaten with poles, which makes the green matter turn blue and settle to the bottom. The clear water is then drawn off, and the blue paste in the bottom is dried in the sun and becomes indigo.

What are the uses of indigo ?

It is one of the most important of all dye-stuffs; all the best blue dyes are made from it, and it is a part of all the black dyes for woollen cloths.

Where did it get its name from ?

From India, where it was first used.

Is not madder also a very useful dye ?

Yes; a great many shades of color are made from it, especially red tints and others called madder-purple, madder-orange, madder-yellow, etc.

What is madder-dye made from?

From the roots of the madder-plant, which grows in the warm parts of both the Old and the New World. The roots are dried, pounded to get off the loose skin, and then ground fine.

What is safflower?

A dyestuff made from the flowers of a plant which grows in the south of Europe, in Egypt, and in Asia. It is wrongly called saffron in the United States.

What colors are got from it?

Several beautiful tints, rose, pink, scarlet, and crimson, much used for dyeing silk and cotton. Rouge is also made from it.

Where is safflower mostly brought from?

From the East Indies, where the flowers are dried, pressed into little cakes, and packed in bales.

What is sage?

A sweet-swelling herb used for flavoring sausages, cheese, soups, and other things.

Why was it called by this name?

The word is made from a Latin word which means to save, and the plant was so named because in old times it was much used as a medicine, and was thought to save sick people.

Are there not many kinds of mint ?

Yes; but those used most are spearmint and peppermint.

Is not spearmint the common mint found in our gardens ?

Yes, it now grows almost everywhere in the United States; but it was first brought here from Europe. It is mostly used for making mint-sauce, and for flavoring soups and drinks.

What is peppermint principally raised for ?

For making oil of peppermint, for flavoring candy, and for making cordials and essences. Essence of peppermint, made by mixing the oil with alcohol, is much used as a medicine.

Is not thyme a kind of mint ?

It belongs to the same family or class of plants with sage and mint. It is used for flavoring soups, stuffing, and other cookery.

Was it not first brought to this country from Europe ?

Yes; but it is now much grown here in gardens.

What is lavender ?

A sweet-smelling plant much used in making perfumes, and for medicine. Oil of lavender and lavender-water are made from it.

What does catnip get its name from ?

It is so called because cats are very fond of its leaves. They have a sharp, bitter taste, and are made into a tea for medicine.

What is rhubarb ?

The dried roots of a plant which grows in central Asia. Most of that used in this country is brought from China. It is given as a medicine.

Is there not another kind of rhubarb, which grows here in gardens ?

Yes; it is commonly called pie-plant, because pies are made from its stems. It first grew on the banks of the Volga, in Russia, but now grows in nearly all parts of Europe and this country.

What is sweet flag ?

A kind of reed which grows in swamps and ponds, and along the banks of rivers.

What are its uses ?

Its roots, which have a strong smell and a biting taste, are used in making candy and toilet vinegar, and sometimes as a medicine.

What were its leaves used for in old times ?

For strewing the floors of houses and churches, on account of their sweet smell when bruised.

What is orris-root ?

The root of a kind of flag-plant which grows wild in the south of Europe. It smells like violets, and is ground up and used to scent tooth and hair powder and hair-oils. A perfume called essence of violets is made from it.

Are there not different kinds of perfumes ?

Yes; some are made from animal substances, but most of them from plants.

What are dry perfumes ?

Simply sweet-swelling gums, resins, and herbs pounded or ground up together. Incense, used for burning in Roman Catholic churches, and sachet powders are dry perfumes.

What are liquid perfumes ?

Oils made by distilling the different parts of plants, such as the flowers, leaves, bark, sap, roots, seeds, and fruits.

Are not such oils called essential oils ?

Yes; because they have in them the essence or strength of the plant. They are sometimes called also ottos or attars; thus, the otto or attar of roses is an oil distilled from rose-flowers.

Is not the perfume of some kinds of flowers spoiled by heat ?

Yes; their perfume is got by spreading the flowers over frames covered with beef suet or lard, or with cloths covered with olive-oil. At the end of the flower season the grease and oil are scraped off and squeezed out and put into alcohol, when all the perfume leaves the grease and mixes with the spirit.

Are not perfumes for the handkerchief made in this way?

Yes; the principal flowers used are the rose, tuberose, orange, jasmine, violet, acacia, and jonquil; and the other flower perfumes are made from these by mixing them in different ways.

What is cologne?

Alcohol perfumed with essential oils. The best cologne is a mixture of many kinds of flowers, herbs, and spices distilled with alcohol. Most of that sold in stores is only a cheap imitation of real cologne.

What does cologne get its name from?

From the city of Cologne, on the Rhine, where it was first made. The French call it *eau de Cologne*, Cologne water.

What is flax?

Threads from the stem of the flax-plant, out of which linen thread and cloth are made.

What does the flax-plant look like?

It grows two or three feet high, and has slender stalks and leaves and blue flowers.

What kind of seed does it bear?

Brown slippery seed, commonly called linseed. The linseed-oil of trade, much used by painters, is made by pressing linseed.

Are not flax-stalks hollow?

Yes; they are hollow pipes made up of a

woody part covered with a thready rind or bark.

How are the flax-threads got from the bark?

When the flax is ripe the plants are pulled up by the roots, and are drawn through a kind of iron comb which combs off all the seeds. They are then soaked in water until the sap which sticks the thready part to the woody part is softened. The stalks are next squeezed in a machine until all the woody part is broken up, and the threads are then separated from it in another machine.

Are the threads then ready for spinning?

No; the broken pieces have to be combed out, and the threads have to be separated into different thicknesses. They then pass through two or three other machines which make them fit for thread.

How is thread made?

It is made now mostly by machines. In old times it was spun by women on spinning-wheels turned by hand, and the threads for the finest kinds of cambrics and laces are still made in this way.

What is the cloth made from flax thread called?

Linen. It also was once made by hand, but it is now made almost wholly by machinery.

What is its color when first made?

The color of the flax-thread, which is light brown.

How is it made white?

By bleaching. In old times this was done by spreading out the cloth on a grass-field, and watering it several times a day; in a few months the air, light, and dampness bleached it—that is, took all the color out and made it pure white.

Has not a quicker way of whitening cloth been found out?

Yes; both linen and cotton cloths are now bleached in a very short time by a white powder called bleaching-powder.

Where are the best linens made?

In France, Belgium, Holland, and Great Britain. Some are made in the United States, but most of the linen used here is brought from Europe.

What is cambric?

The finest and thinnest kind of linen cloth. It is soft and silky, and has a beautiful gloss.

Where was cambric first made?

At Cambrai, in France, from which town it gets its name.

What is lawn?

The most delicate kind of cambric.

Is there not a kind of linen called damask ?

Yes; it is used for table-cloths and napkins.

What is hemp ?

Threads from the stem of the hemp-plant, a larger and coarser plant than the flax-plant.

How are the threads got ?

In much the same way as flax-threads. The stalks are soaked in water to soften the gummy sap which holds the threads together, and after being dried the woody part is broken up in a machine, and the threads are separated from it by another machine.

What is made of hemp ?

After being spun into thread it is woven into different kinds of heavy cloths, such as canvas for ships' sails, commonly called sail-cloth, tent-cloth, bagging, sacking, and many kinds of cordage and ropes.

Is not canvas for ships' sails sometimes made also of cotton ?

Yes; and sometimes also of cotton and hemp mixed.

What is duck ?

A coarse light canvas, used for small sails.

What is the canvas used by artists to paint oil-pictures on made of ?

Generally of flax-threads. Its face is made

smooth by painting it over with white-lead and rubbing it with pumice-stone.

Do not ladies use a kind of canvas to embroider on ?

Yes ; a light kind, made with very open threads.

How were ropes made in old times ?

In former times they were all made by hand in long buildings called rope-walks. Small cords called yarns were first spun, and these were afterward twisted together into ropes.

Are not some still made in this way ?

Yes ; but most of them are now made by machinery, which spins them much more quickly and evenly than they can be done by hand.

What is a cable ?

The largest kind of rope made, used for mooring and anchoring ships ; but cables made out of chains have mostly taken their place.

Are not ropes also made of iron wires ?

Yes ; such ropes are now much used for the rigging of ships, and for making the cables for suspension-bridges, because they are much stronger and last longer than those made of hemp.

Are not hemp ropes sometimes tarred ?

Yes ; the yarns are covered with tar before

they are twisted into ropes. The tar preserves them by keeping out the water.

What is tow ?

The coarse and broken threads combed out of flax and hemp. It is used for making common sacking and cheap twine, for oiling and cleaning machinery, and for caulking the seams of ships—that is, for driving into the cracks between the planks on their bottom and sides to keep them from leaking.

Is not manila a kind of hemp ?

It is sometimes called manila-hemp, but it is really the thready part of a kind of banana-tree which grows in the Philippine Islands. It is called manila because most of it is brought from the city of Manila.

What are its uses ?

Ropes and cordage are made of the coarse threads, and the fine ones are woven into napkins, muslins, veils, and other things. Some of the cloths made from manila are so thin that one can almost see through them.

Is not jute something like hemp ?

Yes; but much coarser and darker in color. It is made from the inner bark of two East Indian plants of the same name.

What is it used for ?

Mostly for making coarse bagging and sacking called gunny-cloth. This cloth is

much brought to the United States in bales and used for covering cotton bales.

Has it not other uses ?

Yes ; coarse brown paper is made of it ; it is used with false hair for making chignons, and is largely mixed with silk. It has such a gloss that it can scarcely be told from silk, when woven and dyed with it.

What is cotton ?

The down of a plant which grows in the hot parts of both the Old and the New World.

Are there not several kinds ?

Yes ; there are three general kinds : herb-cotton, which is a small plant, shrub-cotton, which is about as large as a currant-bush, and tree-cotton, which grows two or three times as high as a man.

Which kind is mostly grown in the United States ?

Shrub-cotton, but a little tree-cotton is raised on the islands and a few other places along the coasts of the Atlantic and Gulf of Mexico, from which it is called sea-island cotton.

How does sea-island cotton differ from shrub-cotton ?

Its threads are longer, finer, and more silky.

How does the down of cotton grow ?

In pods called bolls, which follow the flow-

ers, and are really the seed-holders of the plant. After the flowers fall the bolls soon burst open, forming balls, which look like snow-white wool.

How is the cotton gathered?

It is picked by hand out of the open bolls. The down has the seeds mixed with it, and it is very hard to get them out.

Were not the seeds once picked out by hand?

Yes; but this work is now done by a machine called a cotton-gin. The first cotton-gin was made by Eli Whitney, an American, in 1793.

What are cotton-seed used for?

Some are used for planting, some are spread upon the fields for manure, and some are pressed to get the oil out of them.

What is the oil good for?

For burning in lamps, for making soap, for oiling machines, and for mixing with paints; it is also mixed with other oils, especially with olive-oil, for eating.

Is not the part which is left after the oil is pressed out also of use?

Yes; it is called cotton-seed cake, and is good food for cattle.

What is done with the cotton after it has been ginned?

It is put into bales, covered with gunny-cloth, and pressed by machinery as small as

possible, so that it can be packed more easily in the holds of ships.

Is the cotton thus sent in bales from the places where it is grown ready to be spun into thread?

No; it has to be cleaned and carded—that is, combed until all the threads lie in one way, and it is then made into threads of many kinds, differing in fineness and weight, such as sewing-thread, lace-thread, stocking-thread, and thread for weaving into cloth.

Is not sewing-thread spun a little tighter than other kinds of thread?

Yes; and it is also dipped in weak gum or starch to make it harder and firmer.

Is all lace thread made of cotton?

No; it may be of cotton, linen, silk, wool, silver, or gold.

How is lace made?

All fine laces are made by hand, but a great deal of very good lace is now made on a machine called the lace-frame.

Are there not two kinds of fine lace?

Yes; pillow lace and guipure or point lace.

How is pillow lace made?

The pattern is drawn on a piece of stiff parchment pricked full of holes; the parchment is laid on a pillow, and pins are stuck into the holes so as to fasten the pattern to it. Around the pillow are arranged spools of

fine thread, which the lace-maker uses, one after the other, twisting the thread around the pins so as to form the kind of net-work always seen in pillow lace.

What are the principal pillow laces?

Valenciennes, Honiton, Mechlin, and Brussels.

How is point lace made?

Each part of the pattern is worked with the needle, and the different parts are then joined together with threads.

What are the principal point laces?

Point d'Alençon, and Brussels point.

What are machine-made laces commonly called?

Bobbin-net. These laces are often of great beauty, and are so cheap that they may be worn by everybody.

How are stockings made?

They are woven on a machine called the stocking-frame, which was first made in the reign of Queen Elizabeth.

Were they knit by hand before that time?

Yes; stockings are supposed to have been first knit by hand in Scotland, about the beginning of the sixteenth century.

How were they made before that?

Of pieces of cloth or leather sewed together.

Were not stockings and trousers at first commonly knit all in one piece?

Yes; and this made the garment called

trunk-hose by our ancestors, which was worn for a long time.

Are not other garments also knit on the stocking frame?

Yes; drawers, under-vests, and other like garments.

What is muslin?

A fine kind of cotton cloth. It is not woven quite so closely as common cotton cloth, so that it is thinner and more like gauze.

Were not beautiful muslins once made in India?

Yes, of such wonderful fineness that they were often spoken of as woven wind; but European muslins, made by machinery, have now taken their place, though they are not so soft and fine.

Where did muslin get its name from?

From Moussul, in Asiatic Turkey, where it was first made.

What is printed muslin?

It is the same as calico. In England common white cloth is called calico; when printed it is called printed calico, or printed muslin.

How is calico printed?

In large machines by means of rollers, each one of which has on it only that part of the pattern made to print one color; but all the parts are made so carefully that after each

roller has rolled over the cloth all the colors printed fit together so as to make one pattern.

Can it not be printed very fast ?

Yes ; a mile of calico can be printed with four colors in an hour.

How are the colors dried ?

After printing, the cloth goes over other rollers through a chamber where the air is heated very hot. This dries all the colors, and the calicoes are then washed, starched, dried, and finished for market.

Where does calico get its name from ?

From Calicut, a seaport of India, from which calicoes were first brought.

What is nankeen ?

A yellow cotton cloth made from a kind of cotton of the same color which grows near Nankin, China, and from which place it gets its name.

What is gun-cotton ?

A kind of cotton which can be fired instead of gunpowder in guns and cannon.

How is it made ?

By soaking cotton in a mixture of nitric and sulphuric acids, and then washing it clean in water and drying it.

Is it not more dangerous than gunpowder ?

Yes ; because it explodes more easily and with greater force.

Was it not much used at one time ?

Yes; especially for blasting rocks; but nitro-glycerine, made from glycerine in nearly the same way, has now mostly taken its place.

What is celluloid ?

A kind of false ivory, made out of gun-cotton, camphor, and other things. When first made it looks much like ivory, but it soon loses its gloss and becomes rough.

What are its uses ?

Knife-handles, combs, brush-handles, and almost everything for which real ivory is used, are made of it; and when colored it is made into false red and pink coral jewelry.

Are not linen and cotton rags valuable ?

Yes; great quantities are used for making paper.

Is all paper made from rags ?

No; only the best kinds of writing paper are made from rags alone; paper for printing books is made from rags and wood; paper for newspapers mostly from old paper and wood; and wrapping-paper, and other cheap kinds, from straw.

Are not paper rags usually very dirty ?

Yes; and linen and cotton rags, and colored rags, are all mixed together.

What is first done with them ?

They are separated into piles, each kind

being put by itself. They are then chopped up in a machine called the rag-cutter, after which they go through the duster, which blows the dust out of them.

What is next done ?

They are boiled in water with some soda and lime, which takes the grease out of them, and most of the dirt, after which they are put into the pulp machine.

Is not this machine in three parts ?

Yes; the first part washes the rags very clean, the second bleaches them white, and the third beats them into pulp, that is, makes them into a soft paste which looks much like starch.

How is this pulp made into paper ?

By means of a machine which takes up the pulp on a kind of belt made of wire gauze. This belt turns round and round on two rollers, one at each end, like the leather belt of a steam engine. The paper is thus made in one long piece, which is afterward cut up and folded into sheets.

Does not the wire gauze leave marks on the paper ?

Yes; but these are mostly pressed out by heavy iron rollers, between which the paper passes, and other very smooth rollers give it a glossy surface.

But are not some of the marks left?

Yes; these can easily be seen by holding several sheets of paper up to the light. In some the wire marks look as if the paper was woven, and such paper is called wove paper; in others there are many marks running up and down, and only a few crosswise, and such paper is called laid paper.

What are water-marks in paper?

Marks made by wires so placed on the other wires as to make letters and figures.

Why do they show in the paper?

Because the paper is thinner in those parts.

Do not water-marks sometimes give a name to the paper in which they are?

Yes; foolscap paper is so called because its water-mark used to be a fool's cap and bells.

Is paper ever made out of old printed paper?

Yes; the printer's ink can easily be taken out by boiling the paper with soda. It is then made into pulp like rags.

How is straw made into pulp?

It is first cut up into small pieces, then boiled in water and soda to get out the gum in it, and then made into pulp in the pulp-machine.

What kind of straw is used mostly?

Rye and wheat straw.

What kinds of wood are mostly used for making paper ?

Poplar and basswood, because they have but little resin in them.

Are not several kinds of pulp commonly mixed together in making paper ?

Yes; wood and straw pulp have always some cotton pulp put with them, and linen pulp is usually mixed with cotton pulp.

How is the color put into colored paper ?

It is mixed with the pulp.

What other things are put in ?

A little white clay, which makes the paper heavier, smoother, and thicker; and a little glue, called sizing, which hardens the surface.

Is not sizing put into the pulp of all writing paper ?

Yes; we could not write on paper without sizing, because the ink would run just as it does on blotting-paper, which has no sizing in it.

What kind of paper did the ancients use ?

They did not know how to make real paper, but they had a kind of paper called papyrus, which was made out of the inner bark of a reed which grew in Egypt. Slices of it were laid together and pressed, and the juice of the plant made the edges stick together.

Who first found out how to make paper as we make it ?

The Chinese. The Arabs learned how

from them, and the art then spread over Europe; but not much was made in England before Queen Elizabeth's time.

What did people mostly write on before that time?

On parchment, made out of skins.

Are not many other things besides paper made out of paper-pulp?

Yes; it is made also into pasteboard, papier-maché, ropes and twine, collars and cuffs, and even boats, tubs, water-buckets, water-pipes, car-wheels, and furniture.

Are not the Chinese and Japanese very skilful paper-makers?

Yes; they make clothing, hats, shoes, pocket-hankerchiefs, and even umbrellas out of it.

What does pasteboard get its name from?

It is so called because it was once made by pasting sheets of paper together until it was thick enough, and then pressing it smooth. But it is now made from pulp, like paper, only the pulp is thicker.

What is the pulp of, common yellow and brown pasteboard made of?

Straw, pieces of old rope, jute, and other coarse things.

How is papier-maché made?

The cheaper kind is made of coarse paper-pulp pressed into moulds; the better kind of

sheets of paper pasted together, and then pressed into moulds and dried.

Is it not then very hard ?

Yes ; so hard that it can be planed, filed, and cut into any shape.

What is next done to it ?

The surface is rubbed smooth with pumice-stone, and it is then varnished several times, each coat being dried. When done, it is ornamented with gilding and painting, and sometimes with pieces of mother-of-pearl, silver, and other things.

Were not many things once made of papier-maché ?

Yes ; such as trays, boxes, album and portfolio covers, tables, chairs, and other furniture, but they are now mostly out of fashion.

How are paper-hangings made ?

The paper is made like other paper, in long rolls on machines, and then printed by other machines just as calicoes are printed.

How is satin paper made ?

By coating the paper with powdered French chalk, and then rubbing it with a brush until it is smooth. This is done before it is printed.

What is the right name of the fuzzy paper that feels like velvet ?

Flock paper. It is made by coating the paper with varnish, and then sprinkling it with flock, or the shearings of woollen cloths

from cloth mills, ground up and sifted very fine.

How are gilded papers made?

By printing the pattern with varnish, and then laying gold-leaf on it; the part which covers the pattern sticks fast, and the rest is brushed off.

Are not some wall-papers made by hand?

Yes; some of the finest kinds, but most of them are printed on machines.

Where do we get our word book from?

From the Anglo-Saxon word *boc*, which is made from another word (*beoċce*) meaning a beech tree.

Why was it so called?

Because thin boards made of beech wood were used to write on.

Were the books of the ancients made in this way?

Sometimes, but most of their books were made in a long narrow piece, which was wound round a wooden roller, just as a wall-map is rolled up.

What did the Romans call a book?

Liber, and from this we get our word library.

Do not books now have different names, according to their size?

Yes; a common school reader is a 12mo, or, as it is called in Latin, a duodecimo; the next larger size is 8vo or octavo, and then

follow 4to or quarto, and folio. The next smaller size to 12mo is 16mo, and then 18mo, 32mo, and 36mo.

Are quarto and folio books much printed now?

No; because they are not easy to handle. The most common sizes are 8vo for large works, and 12mo and 16mo for small books.

Has not beech wood many uses now?

Yes; it is made into shoe-lasts, tool-handles, bowls, and rollers, and in France into wooden shoes called *sabots*. It is also used for mill wheels, and other wood-work under water, because it does not rot easily in the water.

What kind of nuts does the beech tree bear?

Little three-cornered nuts. Squirrels and other small wild animals, and some birds like them very much, and they are also fed to swine and poultry.

Is not a kind of oil made from them?

Yes; in France beech-oil is pressed from them, which is both eaten and burned in lamps.

Do not the oak, the chestnut, and the hazel belong to the same family or class of trees with the beech?

Yes; they all belong to the oak family.

Where do oak trees grow?

In almost all cool climates, but some are found in warm countries.

Are they not among the finest and most valuable of forest trees ?

Yes ; they have large and strong trunks, and wide-spreading branches, and their wood is among the most useful of all.

What is the most valuable kind of oak in the United States ?

The white-oak ; its hard, tough wood is much used for ship-building, wagon-making, and farmers' tools, and its bark is excellent for tanning leather.

Is it not also used for fuel ?

Yes ; but it is not quite so good as hickory-wood.

What other kinds of oaks are used for ship-building ?

The burr-oak and the rough white-oak are almost as valuable as the white-oak ; and the live-oak, which grows along the coast, from Virginia to Texas, is the best of all trees for ship-building, and for any kind of wood-work under water.

Is not the live-oak an evergreen ?

Yes ; and its leaves, which are thick and shiny, are not formed like those of other oaks, but are smooth along the edges.

From what kind of oak is oak furniture commonly made ?

From the European oak, sometimes called British oak and royal oak, which grows almost all over Europe and western Asia.

Does it not grow in the United States?

Not wild; but it does well when planted here.

Are not the acorns or seeds of the oak tree valuable?

Yes; some kinds are largely used for food in Spain, Algeria, and other countries around the Mediterranean; and in California the Indians pound them up and make cakes and mush out of the meal. The cup of one kind is also used for making a black dye, and for tanning leather.

Are not other dyes got from oaks?

Yes; the yellow dye called *quercitron* is made from the yellow-barked oak, which grows in Europe, and the scarlet dye called *kermes* is made from an insect which feeds on a shrub-oak which grows on the eastern coasts of the Mediterranean.

What is cork?

The outer bark of a kind of oak which grows in countries around the Mediterranean.

Does not the taking off of the bark harm the tree?

No; because the inner or living bark is carefully kept so that the tree shall not stop growing.

Does the outer bark grow on again?

Yes, in about ten years; the cork is then taken off again, and the tree is barked every *eight or ten* years as long as it lives.

What is done to the bark after it is taken off?

It is first soaked in water, then dried over a fire, and lastly pressed flat under weights.

What are the uses of cork?

It is largely cut up to make corks for bottles; it is also used in making cork-jackets and other kinds of life-preservers, floats for nets, life-boats, soles for shoes, and other things.

Is not a kind of black paint made from cork?

Yes; Spanish black is made by grinding burnt cork-chips in oil. It is also used for making printers' ink.

Is not the chestnut a very large tree?

Yes; one of the largest that grows. A chestnut-tree on Mount Etna is so large that it would take sixty-five of a man's steps to go round it.

What are the uses of the chestnut?

Its wood is much used in house-building and in making furniture, and its bark for tanning leather, though it is not so good as oak-bark.

Is not its fruit also valuable?

Yes; chestnuts are very good to eat. In the south of Europe they form a large part of the food of poor people, being eaten raw, boiled, or roasted, or ground into meal and made into bread and puddings.

On what kind of tree do filberts grow?

On the hazel tree; so that the filbert is only a kind of hazel-nut. In Europe those hazel-nuts which have a long bearded husk are called filberts (full-beards), those with a short husk hazel-nuts, and the round, hard-shelled nuts cob-nuts.

Where do the filberts brought to the United States come from?

Spain, and other parts of the south of Europe.

Do not hazel-nuts grow in this country?

Yes; a small kind grows on bushes about as tall as a man.

What is hazel wood good for?

For making crockery-crates, hoops, and whip-handles. Its charcoal also makes good crayons.

Is not the birch tree also very useful?

Yes; the wood of the white-birch, which is the most common kind in this country, is used by turners, coopers, and wheelwrights; and in some countries its bark is made into shoes, hats, shingles, boats, drinking-cups, and ropes.

Are Indian birch-bark canoes made of it?

No; they are made of the bark of the paper-birch, which grows in Canada and the northern United States.

Why is it called the paper-birch ?

Because its bark is so thin and smooth that it can be used for paper. The beautiful boxes, baskets, and cups which the Indians make and ornament so prettily are made from it.

Is there not also another kind called the black or red birch ?

Yes ; it grows mostly in the Southern and Middle States. Birch-brooms are made from its twigs, and the best of barrel-hoops from its branches.

Does not the alder grow mostly in North America ?

Yes ; the principal kinds grow here, but some are found in Europe.

Is its wood valuable ?

Yes ; it is much used for turning and for making mill-wheels, and other wood-work under water. Its charcoal is the best for making gunpowder, and its bark is used in tanning leather and in dyeing cloth.

Are there any walnut trees in the United States ?

Yes, two kinds ; the black-walnut and the butternut, or white-walnut. The fruit commonly called walnut is rightly called hickory-nut.

Is not the wood of the black-walnut very valuable ?

Yes ; it is much used for furniture, cabinet-work, gun-stocks, and other fine wood-work.

What is butternut wood used for ?

It is used for making furniture, and is often put with black-walnut as a contrast to it, as it has a good yellow color. Gun-stocks are sometimes made of it.

Are not the fruits of these two trees good to eat ?

Yes; but they have much oil in them and soon spoil.

What is the English walnut, sometimes called the Madeira nut ?

The fruit of the European walnut, which grows almost all over Europe, and in some parts of Asia. The nuts are larger than our hickory-nuts, and have a smooth, thin shell.

Where do those brought to the United States mostly come from ?

From Naples, Sicily, and Bordeaux.

Is not the wood of this tree also valuable ?

Yes; it is much used for cabinet-work, especially in France. In the United States it is commonly called French walnut.

Are there not several kinds of the hickory tree ?

Yes; the shell-bark, or shag-bark hickory, which bears the common hickory-nut; the Western shell-bark, which bears larger, but not so sweet, nuts; the pecan hickory, on which the pecan-nut grows, and the pig-nut.

What is hickory wood most used for ?

For making carriage-shafts, wheel-spokes,

whip-handles, large screws, hoops for casks, and many other things which need a hard, tough wood.

Does it make good fuel ?

Yes; the best of fuel and charcoal.

What is charcoal ?

Coal made by charring wood.

How is the charring done ?

By burning the wood in a great pile called a coal-pit.

How is a coal-pit made ?

Sticks of wood are piled up in a large, round heap, with a hole left in the middle for a chimney, and another hole leading from the outside of the heap along the ground to the bottom of the chimney, so as to let the air in and make a draught. The spaces between the logs of wood are then filled with chips and leaves, and the whole is covered with sods and earth.

How is it fired ?

The fire is set going at the bottom of the chimney and spreads little by little all through the wood, care being taken to keep it from blazing.

What would happen if it should blaze in burning ?

The wood would be all burned up and nothing but ashes would be left; but by keeping the air from the wood, it is made to

burn very slowly, and when the fire goes out the wood will be found turned into charcoal.

What are the uses of charcoal?

It is largely used for fuel, especially in countries where there is no hard coal, and for smelting metals. It is also used in filters for purifying water, syrups, and other liquids; is put into sewers and drains to destroy bad smells, and is one of the principal things in gunpowder.

Why are these heaps called coal-pits?

Because charcoal was first burned in pits dug in the ground.

Is not the elm a very beautiful tree?

Yes; especially the white or American elm, which grows in the northern and middle United States. It is one of the finest of shade trees, its branches often making great arches overhead.

What is its wood used for?

For making hubs for wheels, cattle-yokes, blocks for the rigging of ships, and many other things.

What are blocks?

Small round boxes with pulleys or little wheels inside of them, over which the ropes of ships are pulled. The rope goes over the pulley inside the block, and as the pulley

turns round, like any other wheel, it is easy to pull the rope over it, and so heavier weights can be raised than without a block.

Is there not a tree called the slippery-elm?

Yes; it is so named from its inner bark, which has much slippery mucilage in it. It is dried and used for medicine.

What are the most common kinds of maple trees in the United States?

The sugar-maple, the swamp-maple, and the silver-maple.

Is not the sugar-maple very valuable?

Yes; the straight-grained kind is much used for making lasts for shoes, buckets, and other things; and two kinds of it, called curled and birds'-eye maple, because their grain is twisted or marked like birds' eyes, are used in cabinet-work.

Is it also good for fuel?

Yes; its wood is almost as good as hickory for fuel, and it makes the best of charcoal.

What are maple-sugar and maple-syrup made of?

The sap of the sugar-maple. The sap is got from the trees in the spring by boring holes into their trunks, and putting in little pipes or spouts. The sap which runs out is caught in buckets, and boiled down until much of its water is driven off in steam and that which is left is thick like syrup.

How is sugar made from the syrup?

By boiling it still more until it is thick enough to turn into sugar when it cools. This is poured into little pans of different shapes and left to harden.

Where does the swamp-maple mostly grow?

In damp woods and swamps. In autumn it is one of the most beautiful of our trees, as its leaves turn orange, scarlet, and crimson.

What is its wood used for?

For making gun-stocks, lasts, and cheap furniture. Its bark makes a good black dye.

Is not the silver-maple a handsome shade tree?

Yes; and it is much prized in the Western States for planting on the prairies, as it grows very quickly.

Is the horse-chestnut much like the common chestnut-tree?

No, it is more like the maple; but it is not worth so much as the maple, as its wood is soft.

What, then, is it raised for?

Mostly for ornament, as it is handsome in form, and bears beautiful white flowers.

Does it not also bear nuts?

Yes; it has a large nut covered with a thick prickly shell, which splits into three parts before it falls. The nuts are bitter and

not good to eat, but in France they have a way of taking out the bitter taste, and they then make them into a kind of meal which is much eaten by common people.

Why are they called horse-chestnuts?

Because they used to be ground into meal and fed to horses.

What is the buckeye?

A kind of horse-chestnut which grows in the Western States.

Is not the wood of the ash tree very valuable?

Yes; it is very hard, tough, springy, and straight-grained, and is much used by wheelwrights, carriage-makers, ship-builders, joiners, and turners.

Are not oars for boats made of it?

Yes; it is the best of all woods for heavy oars, and one of the best for bows.

What is the linden tree commonly called in the United States?

Basswood. In the north of Europe it is called the bast tree, because its inner bark is the bast from which mats, coarse sacking, ropes, and baskets are made.

Has it not still another name?

Yes; in Europe it is sometimes called also the lime tree.

What is linden wood used for?

Wooden bowls and boxes, and the seats of

chairs are made from it ; and in Germany it is largely used for making carved toys.

Is not its charcoal also valuable ?

Yes ; it is used for tooth-powder, and for making crayons and gunpowder.

What is the principal street in Berlin called ?

Unter den Linden (Under the Lindens), from the lindens with which it is lined.

Are not linden flowers very sweet ?

Yes ; they are much liked by bees, and great quantities of fine honey are made near the forests of these trees in the Western States and in Germany.

What is the plane tree commonly called in the United States ?

Buttonball or buttonwood, and sometimes sycamore. The buttonballs, which it bears, are the seed of the tree, covered with a kind of bristly down.

What is its wood used for ?

Sometimes for ship-building, and for joiners' work, but it is not worth much.

Is not the willow a very valuable tree ?

Yes ; it has a great many uses. Its wood is light but firm, and in countries where it grows plentifully it is used much as we use pine. It makes good fuel, and its charcoal is used for making gunpowder and crayons. Its bark is good for tanning leather, and in

some countries its leaves are gathered and cured for winter food for cattle.

Is not the osier a kind of willow ?

Yes; it is the name of several kinds whose long shoots are much used in basket-making.

How are these prepared for making into baskets ?

They are cut once a year, soaked in water, and then peeled by a tool made for the purpose. For coarse work they are used whole and round, but for fine basket-work they are split into flat strips, like the straw used in plaiting straw hats and bonnets.

Are not the shoots of other trees also used in basket-making ?

Yes; ash, elm, and birch shoots and splints are also used. Strong baskets are also woven out of rattan canes, and much furniture is now made from them.

Were the ancients skilful in basket or wickerwork ?

Yes; the Egyptians made good baskets, and some of them have been found in their tombs. The Assyrians made boats of wickerwork, and the same kind of boats are still used on the river Tigris.

How are they made water-tight ?

By a coat of asphaltum smeared all over, which soon becomes as hard as stone.

Did not the ancient Britons use this kind of boat ?

Yes; and they also built huts of wicker-work, and made great cages of it in which

they shut up and burned alive their prisoners of war.

What is the most common kind of poplar in the United States?

The cottonwood, which is found from New England to the Pacific coast. It gets its name from the cotton with which its seeds are covered.

Is it not sometimes called the necklace poplar?

Yes; because its flowers look something like a string of pearls.

Is this the kind of poplar which used to be much planted in avenues in this country?

No; that was the Lombardy poplar, so called because it first became well known in Lombardy. It is an unsightly tree, and only few of them are now to be seen.

Did not the locust tree first grow in North America?

Yes; but it is now raised in different parts of Europe. It has white, sweet-smelling flowers, and its wood is good for railroad ties, fence-posts, and for some parts of ships.

What does the locust tree get its name from?

It is so called because its branches look something like the legs of a flying locust.

Where does the sassafras tree grow?

Only in North America. In the northern United States it is little more than a shrub, but in the Southern States it is often as high as a house.

What are its uses?

It has a strong smell not liked by insects, and is therefore made into trunks and drawers to keep furs and woollen clothes in. A tea is sometimes made from the bark of its roots, and used as a medicine.

What are the principal kinds of pine tree in the United States?

The white pine, which grows from Canada to Georgia, and the yellow pine, which grows mostly along the Atlantic coast from North Carolina southward.

Is not white pine a very large tree?

Yes; it is one of the largest of forest trees, being often more than twice as high as a four-story house.

Is it not among the most useful of all trees?

Yes; its wood is soft and easily cut, and from it is made most of the woodwork inside of houses; it is also used for the frames of buildings, the timbers of bridges, the masts and spars of ships, and many other purposes.

Does the yellow pine grow as tall as the white pine?

No; it is seldom much more than half as high.

What are the nature and uses of its wood?

It is harder and tougher than white pine, and is much used in ship-building, for making floors, and for other things for which harder wood than white pine is needed.

What valuable things are made from it ?

Turpentine, resin, tar, and pitch.

What is turpentine ?

The sap of the pine, fir, and some other trees. The turpentine used in the United States is got mostly from the yellow pine.

How is it made ?

A cut is made through the bark of the tree, and the sap flows out and is caught in pails or jars set to catch it. This, which is called crude turpentine, looks much like honey.

What is spirits of turpentine ?

The same as oil of turpentine. It is made by distilling crude turpentine in a still. The solid part left in the still is common yellow resin or rosin.

What are the uses of resin ?

It is used in making soap, candles, varnish, and fireworks; the seams or cracks in the sides and bottoms of ships are smeared with it, and it is rubbed on violin bows to keep them from slipping on the strings.

What is tar ?

A black, impure kind of turpentine made by burning the wood of dead pine and fir trees, or of those which are too old to give turpentine.

How is the wood burned ?

A shallow hole is made in the top of a

bank, filled with pieces of the wood packed close together, and then covered with turf and earth, a place being left to set fire to the heap. As the wood burns slowly the tar melts out of the wood and runs off through a spout in the side into barrels set to catch it.

What does the tar thus made look like ?

It looks like molasses, but is much blacker. The black color comes mostly from the smoke in burning.

What is left after all the tar is got out of the wood ?

Nothing but charcoal.

What are the uses of tar ?

The ropes of ships are covered with it to preserve them from water, and wood to be used under water is often painted with it. Sheets of canvas painted with it make tarpaulins, used for covering goods to keep them dry.

What is pitch ?

Tar boiled in an open kettle until most of the watery matter passes off in steam. A solid, shiny substance called pitch is left behind, which can easily be broken into pieces when cold, but becomes soft when heated.

What is it good for ?

It is much used for covering the bottoms of vessels to make them water-tight.

What is lamp-black ?

A kind of soot made by burning pitch, resin, coal-tar, and other such substances in close iron vessels. These give off a very thick smoke, which passes off into a chamber covered with a coarse woollen cloth. The lamp-black settles on this cloth, from which it is shaken off and put into barrels.

What are its uses ?

Printers' ink, blacking, and black paint are made from it.

Why is it called lamp-black ?

Because it was formerly made from the smoke of lamps.

Does the larch tree grow in America ?

Yes; it is commonly called hackmatack in New England, and tamarack in the South and West.

Is not its wood very lasting ?

Yes; and for that reason it is much used for railway ties, and for ship building. Its bark is good for tanning leather.

What kind of fir tree is common in the northern United States and in Canada ?

The balsam fir, the juice of which is called Canada balsam, or balm of Gilead.

What is Canada balsam used for ?

When mixed with spirits it makes a good varnish for maps, and it is also used for

mounting objects to be looked at under the microscope.

Is not the hemlock or hemlock spruce a valuable tree ?

Yes ; a good deal of common lumber, much used for beams and rafters of houses, and for covering the outside of houses under the clapboards and shingles, is got from it.

Is not its bark much used for tanning leather ?

Yes ; and great numbers of forest trees are killed every year by having their bark stripped off and then being left to decay.

Is the spruce tree the same as the hemlock spruce ?

No ; but it belongs to the same family or class of trees.

What is our most common spruce ?

The black spruce, which grows almost all over Canada and the Northern States.

Is not its wood very tough and strong ?

Yes ; and it is much used in ship-building, both for masts and spars, and in the hull or bottom part. Good shingles are also made from its wood, and its young shoots are made into spruce beer.

What kinds of cedar trees grow in the United States ?

The two most common kinds are the white cedar, which is a kind of cypress, and the red cedar, which is a kind of juniper.

What is the color of the wood of the white cedar ?

Light red. It is a very tough and lasting

wood, and is much valued for making shingles and fence posts.

Of what color is the wood of the red cedar?

It is a darker red. It also is very lasting, and it has a pleasant smell, which is not liked by insects; it is therefore much used for making chests and closets to keep clothes in.

Is not the wood part of lead-pencils made of it?

Yes; the best cedar for lead-pencils grows in Florida, and much of it is sent from there to Europe every year.

What is Spanish cedar?

The wood from which cigar-boxes are made. It is really not a cedar, but a kind of mahogany. Pencil-cases are sometimes made of it also.

Was not cedar wood much used in ancient times for building?

Yes; but it was different from our cedar wood. Much of it was the wood of the cedar of Lebanon, a very large tree which grew in the coldest parts of Lebanon Mountains, in Syria.

Is not the tree commonly called the cypress in the middle and southern United States very large?

Yes; it often grows twice as high as a four-story house. It is a kind of pine which does best in damp, swampy places.

What is its wood used for?

Its wood, which is soft and straight-

grained, is used at the South by carpenters for the same things that white pine is used for here. It is also much used for all kinds of wood-work in wet places, as it will not rot under water.

What is mahogany?

The wood of a tree which grows principally in South and Central America and the West Indies.

Is it not a very large tree?

Yes; its trunk is often five feet thick.

Is not mahogany very valuable?

Yes; but it differs according to its color and the beauty of its veins and markings. Sometimes single logs have been sold for more than \$5,000 apiece.

Is it as much used now as it once was?

Not for furniture, but the inside wood-work of railway cars is often made of it or veneered with it.

What do you mean by veneered?

Veneers are very thin slices or leaves of wood which are glued on to some cheaper kind of wood, which is thus made to look like the finer wood; and wood thus covered is said to be veneered.

What does rosewood get its name from?

It is so called because when sawed or cut, it has a sweet smell much like that of roses.

What is it used for ?

For ornamental furniture and cabinet-work. As it is very costly, it is mostly used as a veneer for other woods.

From what countries do we get rosewood ?

The finest comes from South America, especially from Brazil, but some is brought from Jamaica and some from the East Indies.

What is ebony ?

The wood of several trees which grow mostly in the East Indies. It is very hard and heavy, and takes a fine polish.

Are there not several colors of ebony ?

Yes; there is a black, a red, a yellow, a green, and a striped kind, black and white, but the black kind is the one used.

What is ebony mostly used for ?

As a veneer for ornamental furniture. The solid furniture commonly called ebony is made of cherry-wood dyed black.

Is not ebony scarce and costly ?

Yes; only the core or heart of the tree is used, the outer wood being soft and light-colored.

Where does satinwood come from ?

There are two kinds, one of which comes from India, and the other from the West Indies.

What is the difference between them ?

The Indian kind is dark yellow, somewhat

like boxwood; the West Indian is handsomer, being of a light canary yellow.

What is satinwood used for?

Handsome pieces are cut into veneers for fine furniture, and the common kinds are used mostly for the backs of brushes.

What is boxwood used for?

Mostly for engraving woodcuts; it is also used for making small ornaments, rules, and flutes and clarionets.

What is Brazil-wood?

A red dyewood, used in dyeing silks. Shades of orange, yellow, violet, and purple are made from it. It is also used for making red ink.

Did not the country of Brazil get its name from this wood?

Yes; the word Brazil is made from a Portuguese word (*brasa*), meaning glowing embers, and the wood was so called on account of its color. The country of Brazil was named from the wood, because so many of these trees are found there.

What is camwood?

A dyewood brought from Sierra Leone, in Africa, now much used instead of Brazil-wood.

Is not logwood also a red dyewood?

Yes; from it are made bright and dark red

dyes, and, by mixing other things with it, lilac, violet, purple, and black.

Where does logwood come from ?

Central America, Mexico, and some of the West India islands.

Why is it called logwood ?

Because it is sent to other countries in short logs.

What is fustic ?

A yellow dyewood got from a tree which grows in South America and the West Indies.

What is it mostly used for ?

For dyeing cloths and yarn which have first been dyed blue, which the fustic changes to green.

What kind of a tree is the box tree ?

It is an evergreen, with deep green, shining leaves, and grows more than three times as high as a man. The dwarf-box, often seen in hedges or borders in gardens, is a kind of the same tree.

Where does most of the boxwood come from ?

From Turkey and the Greek Islands, and from Spain.

Is not the bamboo a kind of grass ?

Yes ; but it grows as large as some trees, being usually as tall as a pretty high house.

Its stems, which are jointed, are one to eight inches thick.

Where does the bamboo grow?

In Asia, and in the West Indies.

Do not the Chinese make great use of the bamboo?

Yes; they plant large fields with shoots of it, which in four or five years grow large enough to be cut. They make almost everything out of its reeds—houses, fences, boats, water-wheels, furniture, umbrellas, canes, fans, hats, paper, water-pipes, and handles for tools and weapons.

Do not the Chinese eat some parts of it?

Yes; they eat the seeds like rice, and the tender shoots like asparagus; and they also make the shoots into pickles and preserves.

Is the rattan also a kind of grass?

No; the rattan is a kind of palm tree which grows in the East Indies. It has a slender, reed-like stem, seldom more than an inch thick, which climbs like a vine over the tops of trees.

What are these long stems used for in the East?

For making ships' cables, cables for suspension bridges, and other kinds of ropes.

What are rattans mostly used for in Europe and in this country?

For many kinds of plaited and wicker work, such as chair bottoms, ladies' work baskets, and other baskets, and for making

furniture. Malacca canes are made from a sort of rattan palm.

What are cocoanuts?

The fruit of the cocoanut palm tree, which is found principally in the islands of the Pacific and Indian Oceans.

Is it not a large tree?

Yes; it is sometimes two feet thick, and twice as high as a four-story house. It has no branches, but has a crown of feather-like leaves at the top, under which the nuts hang in bunches.

How do the nuts grow?

Each one has a thick, soft husk, inside of which is the nut in a hard, round shell. When green, the shell is lined with a soft, white jelly, within which are from one to two pints of clear liquid. When the nut ripens the jelly becomes hard, and the liquid, or milk as it is called, very sweet and sickish to the taste.

Is not almost every part of the cocoanut tree useful to man?

Yes; the young roots are chewed by the people of the Pacific islands, and are woven into baskets; the trunk of the tree is made into canoes, houses, and fences; the young leaves are cooked and eaten like cabbage, and the old ones are made into cloth, hats, baskets, lanterns, fans, fish-nets, writing

paper, and other things; and the ribs of the leaves are used for paddles for boats, spears and arrows, brooms, and torches.

Are not several drinks also made from it?

Yes; from the flowers is made a drink called toddy, which, when fermented, is called palm-wine. When fermented still more it makes good vinegar; and a kind of sugar called jaggery is made by boiling down fresh toddy.

What is coir?

The outer husk of the cocoanut. It is made into cordage, matting, mattresses, brushes, and brooms.

What is cocoanut oil?

Oil pressed from ripe cocoanuts. It is sent to foreign countries and made into candles, soaps, ointments, and hair dressings.

Where do Brazil nuts grow?

Mostly on the Orinoco River, in South America. They are called Brazil nuts because most of them are brought from Brazil.

How do they grow?

They grow on very high trees, in smooth, round cases, half as large as a man's head. The three-sided nuts are packed closely together in the case, with the sharp edge inward, somewhat like the parts of an orange, as many as twenty or thirty being sometimes in one case.

Are not monkeys very fond of these nuts ?

Yes; and they often pick the cases, and throw them down to break them. This has taught the Indians how to get the nuts; they pelt the monkeys with stones, and the monkeys hurl down the cases full of nuts at them. In this way large quantities of the nuts are gathered on the banks of the Orinoco, and brought down the river in boats.

What are the nuts used for ?

When fresh they are very good to eat; and the oil in them is sometimes pressed out for burning in lamps.

Where are almonds mostly brought from ?

From France, Spain, Italy, Malta, and the East. The finest kind, called Jordan almonds, are brought from Malaga.

How does the almond grow ?

It is covered with a hard, green shell, which dries as it ripens, and finally bursts open, and lets the nut drop out.

Are there not two principal kinds of almonds ?

Yes; the sweet and the bitter almond. Sweet almonds are largely used in making candy and for dessert; but bitter almonds are not good to eat.

Is not good oil pressed from almonds ?

Yes; it is used as a flavor in medicines, and for scenting toilet-soap.

THE ANIMAL KINGDOM.

From what animals do we get milk ?

In this country we get it mostly from the cow, but in some foreign countries the milk of the goat, sheep, ass, mare, camel, and buffalo are much used.

Is not milk also got from a tree ?

Yes, the juice or sap of a tree called the cow-tree, which grows in South America, is called vegetable milk. It looks like milk, tastes much like it, and is said to be very wholesome.

Is not cows' milk the best of all milk ?

Yes ; but cows cannot be kept in all places, and so other kinds have to be used.

What does milk look like ?

Like a white liquid ; but when looked at through a microscope, an instrument which enlarges things very much, it is seen to be a bluish liquid, filled with little, round, floating balls of fat, each one of which is covered with a thin skin.

What happens to these little balls when milk is set away in pans in a cool place for a few hours ?

They rise to the top and form the rich yellow crust called cream.

Is not butter made from cream ?

Yes; by shaking up cream in a churn, the skins of the balls are broken, and the fat in them runs together and makes butter.

Does all the cream turn into butter ?

No; a watery kind of milk is left which is called buttermilk.

What is done with the butter when it is taken from the churn ?

It is washed in cold water, then worked until all the buttermilk is got out of it, and lastly salted and put up into rolls for use.

How was butter making first found out ?

By carrying milk in skin bottles, on a camel; the jolting turned it to butter.

Is not butter made in nearly the same way in South America ?

Yes; the cream is put into gourds or skin bags and tied on the back of a donkey, which is made to trot round till it turns to butter. In Buenos Ayres a skin bag full of cream is tied to the end of a long leather rope, and the other end is tied to the saddle of a horseman who rides at a gallop, with the bag bumping and jumping on the ground behind him, until the cream is churned to butter.

What is ghee ?

The East Indian name of butter ; it is made mostly from the milk of the buffalo.

What is the butter tree ?

There are two kinds: one, which grows wild in India, bears a fruit with roundish, brown seeds, from which a substance like lard is pressed and used for butter ; another, called the shea tree, which grows in the hottest parts of Africa, bears a fruit like the olive, from which a white butter is made.

What is condensed milk ?

Cows' milk boiled down until most of the water is driven off, and then sweetened with a little sugar, thus making a thick, sweet paste which can be sealed up in tin cans.

Is it not better than common milk for some uses ?

Yes ; because it will keep sweet for a long time, and can thus be carried on sea voyages.

What is cheese ?

The curd of milk pressed in a hoop or mould.

What do you mean by the curd of milk ?

After the cream has been taken off of milk, the part left is called skim-milk. This is made up of curd, from which cheese is made, and a thin, watery liquid called whey.

How is the curd separated from the whey ?

When milk turns sour it separates itself.

but, as the curd of sour milk will not make good cheese, it must be got from the whey while the milk is sweet. This is done by putting a little rennet into it.

What is rennet ?

The dried inner part of the stomach of a young calf. When needed for use a piece of it is soaked in water, and this makes a kind of sour juice which, when poured into milk, causes the curd to separate from the whey.

How is cheese made from curd ?

The curd is squeezed to get out the whey, salted, and pressed in a cheese-press for a few days, until it will stay in the shape of a cheese, and then put into a cheese-room to ripen—that is, to become fit to eat.

How long does it take a cheese to ripen ?

Some will ripen in two or three months, and others, like the Italian Parmesan, take two or three years.

Are not fine cheeses made in England ?

Yes; among the best kinds are the Stilton, Cheshire, and Cheddar.

Where is Gruyère cheese made ?

In Switzerland; it is strongly flavored with herbs.

What is the French Roquefort cheese made of ?

The milk of sheep and goats.

Is not cheese made from the milk of other animals also?

Yes; the Tartars make cheese from the milk of mares, the Arabs from that of camels, and the Laplanders from that of reindeer.

What is beef?

The flesh of the ox or cow, when killed for food. It is richer in flavor and more easily digested than any other food.

How is corned beef made?

By soaking the lean parts of beef in a pickle made of salt, saltpetre, and a little brown sugar, in water.

Is not smoked beef made in the same way?

Yes; but it is afterward smoked over a wood fire.

What is jerked beef?

Beef cut into thin slices or strips, and dried in the sun. Beef is often jerked in countries too hot for fresh beef to keep long.

Were there any cattle in America when Columbus first came here?

No; but the Spanish settlers brought over some with them, and now all the great plains of South America are covered with herds of wild cattle descended from them.

Are not these cattle different in looks from those in the United States?

Yes; they are large, long-legged, and have long, wide-branching horns. Most of the

cattle in Texas and in California are the same kind.

Where did the cattle in other parts of the United States come from ?

They are descended from those brought from England by the early colonists ; but in many places they have become mixed with other breeds brought here since.

What are common cattle usually called ?

Natives. From them comes most of our beef, and many of the cows are as good for giving milk as some of the foreign breeds.

What are the best of the foreign breeds raised here ?

The Durhams, the Ayrshires, and the Alderneys.

Are not the Durhams sometimes called short-horns ?

Yes ; on account of the shortness of their horns. They are called Durhams because they were first brought to the United States from Durham County, England ; but in England they are commonly called the Holder-ness breed.

Are they not much prized ?

Yes ; for the quantity and the richness of their milk, and for the fineness of their beef. They are the favorite breed in the Western States.

Where did the Ayrshires come from ?

From Ayrshire, in Scotland. They are

much liked for their milk, but not so much for their beef, and they do not fatten easily.

Are not the Alderneys sometimes called Jersey cattle ?

Yes; they were first brought from Alderney, one of the Jersey or Channel Islands, off the north coast of France.

What are they valued for ?

For their rich milk, though they do not give as much as the Durhams, and are not so good for beef. They are often kept in private dairies on account of the richness of their cream, and of their gentleness and beauty.

Where do Devon cattle come from ?

From Devonshire, England. They are a handsome, dark-red breed, and make fine oxen.

Were there any horses in America when white men first came here ?

No; all the horses now here are the descendants of those brought here by the early settlers.

Where did the wild horses of South America come from ?

They are descended mostly from horses brought from Spain in the early days.

What did the Indians think when they first saw the Spaniards riding upon horses ?

They thought that the horse and its rider were one.

Are not many wild horses killed in South America simply for their hides?

Yes; thousands are killed every year. Their hides are made into leather, which is much used for covering furniture.

Is not the flesh of the horse sometimes eaten?

Yes; in some parts of Europe it is used for food; in Tartary the milk of mares is used just as we use cows' milk, and a strong drink called *koumiss* is made from it.

How long does the horse live?

It lives sometimes to be thirty years old, but it is seldom of use for more than fifteen or sixteen years.

What is tallow?

The fat of animals of the ox and sheep kind, separated from the other parts by melting.

Is there not also a tallow tree?

Yes; it grows in China, and bears seeds covered with a kind of white tallow, which the Chinese make into candles. They also burn oil made from it in lamps, and from its wood they make blocks for printing.

Do not the Chinese print from type as we do?

No; each page of their books is printed from a block on which the letters are carved.

What is beef tallow mostly used for?

For making candles and soap.

How are tallow candles made?

Either by dipping or moulding. Dipped candles are made by dipping wicks of cotton yarn, hung side by side on a stick, into melted tallow, and left to harden each time, until the candles are large enough. Mould candles are made by pouring melted tallow into tin, pewter, or glass moulds, each of which is shaped like a candle, and has a wick stretched through the middle. The moulds are larger at the bottom than at the top, so that the candles are easily drawn out when cold.

Are not candles made also of other things?

Yes; of spermaceti, stearine, paraffine, and wax.

What is spermaceti?

A substance got from the head of the sperm whale. It looks like a beautiful, pearl-white wax, and makes very good candles.

What are stearine candles made of?

From tallow, so purified of its oily matter that only the solid white part is left. When pure, stearine looks like white wax, and has no taste nor smell.

What is paraffine?

A substance something like spermaceti, made from peat, coal tar, bituminous coal, and other things. Candles made of it are

almost as good as those of wax and spermaceti.

Are wax candles made in the same way as other candles ?

No; the wicks are dipped into melted wax and, when large enough, the candles are rolled into shape on a table, with a boxwood roller; but sometimes they are shaped by drawing them through holes in a machine.

Did the ancients use candles like ours ?

No; the Greeks and Romans sometimes made candles by soaking strips of papyrus in pitch and covering them with wax, but they did not give a very good light, and they used mostly oil lamps to light their houses.

What kind of candles were used in England in early times ?

Rush lights; made of the pith of rushes dipped into tallow.

What is glycerine ?

A sweetish liquid, without color or smell, got from many fats and oils.

What are its uses ?

It will keep meats, fruits, and flowers from decaying; it is good to put on the skin when it is scalded or burned, and it is used to dissolve medicines in.

What is nitro-glycerine ?

Glycerine mixed with nitric and sulphuric

acid, which make it stronger than gunpowder, so that it can be used for blasting in mines, quarries, and tunnels.

What is soap?

A substance made by boiling tallow or other fats or oils in water, with either soda or potash.

What is the water in which soda or potash has been mixed called?

Ley.

Is not ley also made from ashes?

Yes; by pouring water over wood ashes, and catching the drippings. The water takes all the potash out of the ashes and comes out a strong, yellow ley.

Do not farmers make soap with this ley?

Yes; by boiling tallow or other grease in it. This makes soft soap.

How is hard soap made?

By boiling fats or oils with soda ley. A little resin is put in after the boiling is done, which hardens the soap and makes it yellow.

How is it made into bars?

It is poured into wooden or iron frames to harden, and then cut up into bars.

Are not many kinds of oils also used in soap-making?

Yes; fish oils and many vegetable oils, such as palm, olive, cocoanut, rape, linseed, and hempseed oils.

What is Castile soap made of?

Of olive oil and soda. Other fine toilet soaps are made mostly of the same things perfumed in different ways. They are commonly made into cakes which are stamped in a press.

Are there not some kinds of plants which make good soap?

Yes; in the West Indies and in South America grows a tree whose fruit makes an excellent lather and is used to wash clothes; and the bark of a tree which grows in Peru, and of another one which grows in the Malay islands, makes a fine soap.

Is there not one also in California?

Yes; a plant grows there whose bulbs are used in the wash-tub just as we use soap. They make a thick lather which smells like new soap.

What is suet?

The hard fat found principally around the kidneys of sheep and oxen. It is much used in cooking.

What is lard?

The oily part of the fat of hogs, separated from the rest by boiling and cooling it.

From what part of the hog is the best lard got?

From the fat around the kidneys; but *common lard* is made from all the fat.

What are its uses ?

It is largely used for cooking and for making ointments, soap, and lard oil ; and a good deal is mixed with olive oil and sold for pure olive oil.

How is it made into lard oil ?

By taking out of it the stearine, which is used for making candles.

What is the meat of the hog called when killed ?

Pork ; and out of it is made bacon, ham, and sausage.

Were there any hogs in America before the white man came ?

No ; and all the hogs now here, both wild and tame, are descended from those brought from Europe.

Are there any wild ones in America ?

Yes ; in many parts of South America there are immense droves of wild hogs, and in many of the southern and western United States the woods are full of half wild ones, which live mostly on acorns and beechnuts.

Is not the skin of the hog valuable ?

Yes ; it is made into leather, which is used by saddlers, harness makers, and trunk makers.

What are hogs' bristles ?

The long, stiff hairs which grow on the neck of the hog. Great quantities are sent from Russia and Germany every year.

What are made of them ?

Many kinds of brushes, especially hair, nail, clothes, and tooth brushes, and large paint brushes.

What are small paint brushes, used by artists, made of ?

The hair of the camel, badger, sable, squirrel, and other animals.

How are quill paint brushes made ?

Enough hairs for one brush are tied together, and then passed point first through the large end of a quill, which has been softened by soaking in water. When the quill dries it becomes smaller, and holds the hairs tight.

What are the uses of the sheep ?

Its flesh, called mutton, is, next to beef, the most valuable of foods; its skin makes good leather; its wool is woven into cloth, carpets, and other things, and felted into hats; and its horns are made into knife handles and buttons.

In what does wool differ from hair ?

Hair is usually straight and smooth, but wool is wavy, and when looked at under the microscope it is seen to be made up of little saw-like teeth or scales overlapping each other, and sticking out wherever it bends.

What are the uses of these scales ?

When the wool is spun these scales fit into each other, and hold fast so that the thread

will not untwist; but smooth hair will not keep its twist when spun.

Is the wool of all sheep alike?

No; in some kinds the threads are much longer than in others, and some are fine, while others are coarse. Long-threaded wool is called long-staple, and short-threaded wool short-staple.

Where does most of the wool used come from?

Most of it is brought from Australia, South Africa, and South America; but a good deal is grown in Europe, and in the United States—chiefly in California and other western States, and in Texas.

What kind of goods are made from wool?

Woollen goods and worsted goods.

What is the difference between these two kinds of goods?

Yarn for weaving woollen cloth is only slightly twisted, and the threads of wool in it are crossed in every way, so that they will felt closely together; but yarn for worsted cloth is twisted much harder, and the threads of wool are all kept as straight as possible, so that they do not felt together.

What do you mean by felting?

When wool or fur is pressed or beaten together, all the fibres or threads in it twist round each other and lock their jagged edges

together so as to form a thick matted cloth, called felt.

Will no other kind of threads felt together ?

No ; only fur and wool will felt, for neither silk, cotton, flax, nor hemp threads have the right kind of edges.

Why do woollen garments shrink and become thicker when they are washed ?

Because the threads of the wool felt together when they are rubbed.

How do woollen cloths become felted together ?

After the cloths have been dyed they are made to pass through a machine called the fulling-machine, in which they are pounded in a thick mixture of soap and water, which causes the threads to mat together so that they cannot be seen. The cloth is thus made to shrink greatly, and to become much thicker.

What is done after this ?

The cloth is next teazeled, by being passed over rollers set full of teazels.

What are teazels ?

The burs or flower heads of the teazel plant, which are covered with stiff, sharp prickles. These prickles catch in the wool, and pull up enough of the little threads to make a rough surface all over the cloth.

Is not this surface then cut off ?

Yes ; it is sheared off smooth on one side

in a machine which cuts it very even, and in this way the nap of cloth is made.

What are the principal kinds of woollen goods ?

Broadcloths; among which are meltons, beavers, pilot cloths, and others; narrow cloths, among which are cassimeres, doeskins, and tweeds; and carriage cloths, flannels, blankets, and some kinds of shawls.

What are some of the principal kinds of worsted cloths ?

Merinoes, bombazines, serges, buntings, damasks, reps, poplins, cashmeres, muslin-delaines, and Henrietta cloths.

What is alpaca ?

A cloth made from the wool of an animal living in the mountains of Peru and Chili, mixed with a little silk or cotton.

Is not the alpaca of the same family with the camel ?

Yes; but it is more like a large sheep. Its wool is nearly a foot long, and is soft and silky, and very strong for its fineness.

What were worsted goods named from ?

From the town of Worstead, in Norfolk, England, where they were first made.

Are worsted goods always made of all wool ?

No; some are made of mixed wool and cotton, some of wool and silk, and some of wool, silk, and cotton, or of wool, silk, and linen.

Are not carpets made mostly of worsted yarn ?

Yes; but some of the best kinds, such as

Brussels, Wilton, Axminster, and Turkey carpets, have a linen back.

What were Brussels carpets named from ?

From Brussels, in Belgium, where they were first made ; but they are now made largely in England and in the United States.

Are they not woven by machines ?

Yes ; over wires which are laid across from one side to the other. These wires are afterward drawn out, leaving the worsted yarns standing in a row of loops across the carpet.

Are not Wilton carpets woven in the same way ?

Yes ; but the wires have a little groove along their tops, along which a sharp knife is drawn when the weaving is done, thus cutting all the loops and letting the wires out. The threads, which are thus made to stand up, are afterward sheared so as to make a smooth, even nap.

How are Turkey carpets made ?

They are woven by hand, mostly by young girls in families. Linen threads are stretched up and down from one roller to another, and little bits of colored woollen yarn are twisted round each thread, each tuft being of the right color to make the part of the pattern at that place. When a row of tufts has been made across, a linen thread is put across above them and driven down tight, so that

all the tufts are held fast. Other rows are put on in the same way, and when the carpet is done they are all sheared down even.

Are not Persian carpets made in the same way?

Yes; and they are much like the Turkish, both in colors and patterns.

What are Axminster carpets?

They are carpets made in imitation of Turkish carpets, but handsomer, because they are much more evenly made, and worsted instead of woollen yarns are used in them.

Are they not woven on machines?

Yes; but they are so costly that few are now made.

What are the more common kinds of carpets?

Kidderminster, better known in this country as ingrain and three-ply carpets. These carpets have the same pattern on each side, but the colors are different.

What is bunting?

A thin, light, woollen stuff, made of fine, hard-twisted worsted threads.

What is it mostly used for?

For making flags. It is much lighter, and at the same time stronger, than any other kind of cloth. In making flags, different colors are sewed together.

What is Cashmere?

Cloth made of the wool of the Cashmere or Thibet goat.

Are not cashmere shawls made of it?

Yes; in the country of Cashmere a large part of the people are employed in making them.

What are these shawls commonly called?

They are sometimes called India shawls, and sometimes camels'-hair shawls; but this is wrong, for they have no camels'-hair in them.

Why are these shawls so costly?

Because it takes two to four men a whole year to make a single one. They are worked with wooden needles, each color taking a separate needle. In order to do the work quicker they are commonly made in small pieces, which are afterward neatly sewed together so that the seams cannot be seen.

Are there not other kinds of goats besides the Cashmere goat, whose hair is good for weaving?

Yes; the Angora goat of Asia Minor, and the Syrian goat have fine silky hair, but shorter than that of the Cashmere goat.

What is the wool of the Angora goat commonly called?

Mohair. It is pure white, and as soft and fine as silk. Fine shawls, plushes, braids, and laces are made from it.

Are there any wild goats in America?

No; all the goats in this country were first bought here from Europe. What is called the Rocky Mountain goat is really an antelope.

What other uses have goats?

Their flesh is good to eat, and their milk is much used by sick people and babies, because it is easier to digest than cows' milk; the skins of goats make the best morocco, and those of kids or young goats the best kid gloves; and the horns of goats are made into knife handles, buttons, and other horn things.

What does morocco get its name from?

From the country of Morocco, in Africa, where this leather was first made.

Is it still made there?

Yes; but most of that now used in the United States is either made here or brought from France, where much fine morocco is made.

Is it not dyed different colors?

Yes; red morocco is dyed with cochineal, blue with indigo, and yellow with the root of the barberry bush.

What are the uses of morocco?

It is used to cover chairs and sofas, for lining coaches, for binding books, and for making pocket-books.

What is cheap morocco commonly made of?

Sheep-skins. It is generally thicker and not so firm as goat-skin morocco.

Are all kid gloves made of kid-skins?

No, only the finest kinds; many of the cheaper ones are made of lamb, rat, and other thin skins.

Do not kid gloves have to be very carefully made?

Yes; the skins are prepared and dyed with the greatest care. The different parts of the glove are then cut out with punches, which make, at the same time, the little holes for the stitches along the edge of each. When sewed, the gloves are beaten in a damp linen cloth to soften them, and then pressed.

Where are kid gloves made?

The best are made in France, but some very good ones are made in the United States.

Have not gloves been worn from the most ancient times?

Yes; by almost all nations. In old times they were often richly embroidered, and ornamented with precious stones.

What did the throwing of one's glove on the ground mean in old times?

It was the common way of inviting an enemy to fight a duel.

What is leather?

The skin of an animal tanned

Would the skin of an animal keep if it were not tanned ?

No ; if it were only dried, it would become hard and horny, and if it were put into water, the water would soak into it, and the gelatine in it would soon decay and smell bad.

What is gelatine ?

An animal substance, found in all parts of animals, which melts easily in hot water, but which stiffens like a jelly in cooling.

Is not glue a coarse kind of gelatine ?

Yes ; it is made by boiling the parings from hoofs and hides, and the clippings of ears, tails, and other coarse pieces of animals' skins. When the gelatine is all boiled out of them, the liquor is drawn off and cooled, and, while still a jelly, is cut up into pieces with spades, and afterwards cut into slices and dried.

How are skins tanned ?

They are first soaked in water about two weeks to soften them, and then in deep square holes called vats, filled with lime-water, to loosen the hairs. They are next scraped on both sides, to get off the hair and the fleshy and fatty matter, and afterward tanned by soaking them in a mixture of tan-bark and water for four or five months.

What is tanbark made of?

The best is made from oak or hemlock bark, but other kinds of bark are sometimes used.

How does the bark tan the leather?

Bark has in it a strong puckery substance called tannin, and this unites with the gelatine in the skin, and thus makes leather.

Are the skins or hides ready for use when they are taken out of the vats?

No; they have to be washed and dried, and then hardened by being hammered or rolled under heavy rollers.

Are not skins sometimes split into two skins?

Yes; by a knife worked by machinery, which divides them evenly and smoothly.

Are not the leathers for the upper parts of shoes blackened?

Yes; calf-skins and other upper leathers are rubbed with oil and tallow to make them soft, and then blackened with oil, lamp-black, and tallow.

What is patent leather?

Leather covered with several coats of linseed-oil and umber, mixed with a little lamp-black, and then varnished and dried in ovens. It has a very smooth, shiny surface.

How is Russia leather made?

It is tanned with willow bark, and then treated with birch-bark tar, but in what way

is not exactly known. This gives the pleasant smell which all Russia leather has.

Are the scraps of leather of any value ?

Yes; they are ground up and mixed with certain things until they are made into a kind of pulp or paste. When pressed into moulds and dried this becomes hard and tough; and in this way many useful things, such as door-knobs, canes, combs, and buttons, are made.

What is shagreen ?

A kind of leather made from the skins of horses, wild asses, and camels, and grained so as to have on it little pimples or grains.

How are the pimples made ?

By pressing into the skins while wet the seeds of a plant which grows in the East. When dry the skins are beaten to get the seeds out and are then shaved down on the other side almost to the dents. When the skins are wet again the dents swell up on the shaved side, and make little grains all over it.

Where is shagreen mostly made ?

At Astrakhan, in Russia, and other places in the East.

What is it used for ?

For covering instrument cases and other cases, and small boxes.

What is chamois or "shammy" skin ?

The dressed skin of the chamois, a kind of antelope found in high mountains in Europe ; but most of the leather sold as chamois skin is made of the skins of the sheep, goat, and deer.

What are its uses ?

Undergarments are made of it, and it is used to clean silver, glass, etc.

Is not buckskin made of deer skin ?

Yes ; it is the tanned skin of the deer, the male of which is called a buck. After tanning it is dried and rubbed full of oil and tallow, and when this has soaked in, the skin is rubbed until it is soft.

What is buckskin used for ?

For polishing silverware and jewelry, and for rubbing furniture. In old times short breeches were often made of it, and were therefore called "buckskins."

What is parchment ?

The skin of an animal, made fit to write on. It is commonly made of sheepskin.

Is it not much more lasting than paper ?

Yes ; and it is therefore much used for deeds, and other important law papers which have to be kept a long time.

What is vellum ?

A fine kind of parchment made from the

skins of calves, goats, or dead-born lambs. It is whiter and smoother than parchment.

Are not the heads of drums made of parchment?

Yes; of parchment made of the skins of calves, asses, or wolves, those of wolves being best.

What is catgut?

The material from which the strings of violins, guitars, and some other instruments are made. It is wrongly named, for it is not made of the guts of cats, but of those of sheep, and sometimes of those of horses, asses, and mules.

Where are the best music strings made?

In Italy; but many are also made in France.

What is fur?

The short, soft hair of animals, growing next to the skin and under the outer hair, which is longer and coarser.

What are furs?

Skins dressed with the fur on, and from which the long hairs have been pulled. Skins which have not been dressed are called pelts.

How are skins dressed?

They are soaked and scoured in a bath of bran, alum, and salt, mixed with water, then washed and dried. The alum tans the skins into a kind of leather and makes them soft.

Are not furs sometimes dyed?

Yes; but the only one made better by dyeing is the fur of the seal, which is changed from a dirty yellow to a rich brown, while the hairs, which in the live animal are curly, become straight and of a velvety softness.

Do not furs differ in color in different parts?

Yes; and they have therefore to be cut up into pieces and fitted together again according to colors or tints; but this is so neatly done that the seams do not show.

What are the principal fur-bearing animals?

The sable, ermine, marten, mink, beaver, otter, chinchilla, fox, seal, nutria, badger, rabbit, fisher, lynx, bear, and wolf.

Where is the sable mostly found?

In the wildest parts of Siberia. It is hard to find, and many of the Russian exiles who employ themselves in hunting it, suffer greatly from cold, hunger, and wild beasts.

Is not its fur therefore very costly?

Yes; single skins of a deep, rich, brown color often sell for \$50 to \$75.

What is sable fur mostly used for?

It is worn by rich ladies, and is used for linings for the robes of high officers in Europe. The tails are made into artists' brushes, commonly called sable pencils.

Is the sable found in America?

Not the real sable; the American or Hud-

son Bay sable, which lives in the thick pine woods, in the coldest parts of America, is the pine marten.

Is not its fur also very valuable ?

Yes; it is prized next after that of the sable, and is sometimes dyed and sold for it.

Where does the ermine live ?

In the northern parts of Europe and of Asia.

Is it not much like the sable and the pine marten in shape ?

Yes; all these animals are small and belong to the weasel family; they are shaped like the common weasel, having a long, slim body and short legs.

What is the color of ermine fur ?

In summer it is yellowish brown, but in winter is mostly pure white. The tip of the tail is always black, and, in making up the fur, the tail tips are sewed into the white fur so as to make a regular pattern.

What is ermine used for ?

In some countries it is used for the robes of kings, judges, and other high officers; and it is also worn by ladies for winter garments.

Is there not much false ermine sold ?

Yes; it is made mostly of the fur of cats and rabbits.

What does the ermine get its name from ?

From the country of Armenia, where the

animal is found. In old times it was called the Armenian rat.

Is not the mink also like the weasel?

Yes; and its fur is something like that of the sable. It is sometimes called American sable.

Where is it found?

In the cold parts of North America, Europe, and Asia.

Where is the beaver caught?

Mostly in the northern parts of North America and of Asia. It was once common in Europe, but is now rare.

What are the uses of its fur?

It is now mostly used for the trimmings of ladies' dresses and cloaks, and for men's collars and gloves.

Were not hats once covered with a felt made of beaver fur?

Yes, and men's tall hats were therefore called beavers; but now silk plush is used instead.

What are felt hats made of?

Mostly of the fur of rabbits and of hares; but the fur of the muskrat, and that of the coypu, a small Brazilian animal, is often mixed with them, and cheap felt hats are sometimes made of wool.

Is not the fur cut off the skins by a machine?

Yes; and it is then made into a kind of

bag, shaped like a sugar-loaf, on another machine.

What is it then called?

A shell. Hatters generally buy their hats in this form, and then shape them by ironing them over a wooden block of the size and form of the hat to be made. When this is done they are finished by girls, who bind them, put on the ribbon, and sew in the lining.

What is the body or inside of silk hats made of?

Of several thicknesses of muslin, stiffened with a varnish made of shell-lac. When the silk plush is put on it is ironed, and the heat of the iron softens the varnish and makes the silk stick to it.

Where is the best silk plush for hats made?

At Lyons, in France.

Is not the fur of the otter quite handsome?

Yes; it is short, thick, and fine; in the summer it is almost black, but in winter it is a beautiful reddish brown.

Where is the otter mostly found?

In British North America, though there are some in almost all parts of North America.

Is there not also a sea otter?

Yes; it lives along the northern Pacific coast of America. It looks much like the seal, but has a head more like that of a cat.

Is not its fur also prized ?

Yes; especially in Russia and China. In China mandarins of high rank wear otter fur as a mark of office.

What is the chinchilla ?

A small animal, about as large as a squirrel, with a head much like a rabbit's, with large black eyes, and long ears. It is found principally in the mountains of Chili and Peru.

What kind of fur has it ?

Its fur, which is gray, is thick and soft, and is much used for cloak linings, and trimmings of ladies' and children's dresses.

Is the fur of the fox valuable ?

That of some kinds of foxes is much prized and greatly sought after. The nobles of Russia and China value the fur of the black fox, found in the north-west parts of America, above all others, and pay very high prices for it. There is a great trade, too, in the skins of the blue fox, sometimes called the Arctic fox, which is hunted in the most northerly parts of America, Russia, and Siberia. Its fur, which is long, thick, and soft, is sometimes white, but often of a gray slate color, tinged with blue.

Are the skins of wolves of any use ?

Yes; they have a soft, thick fur, and make good robes for sleighs and carriages.

What kind of an animal is the badger ?

It is about the size of a small pig, and has very short legs, and a long, sharp nose. Its hair is long and coarse, and is commonly yellowish-brown, marked with darker or lighter shades.

What is badger skin used for ?

Soldiers' knapsacks, and the pistol holsters on saddles are sometimes covered with it; and its long hair is mostly made into shaving and paint brushes.

Are not bear skins used for covering pistol holsters ?

Yes, black bear skins; they are also made into hats for soldiers, and into rugs.

What is the animal commonly called the wild-cat in the United States ?

It is rightly named the bay lynx, on account of the color of its fur, which is bay or reddish brown in winter.

Is it the same as the Canada lynx ?

No; the Canada lynx is a little larger animal, and is gray above and lighter gray below. It is much hunted by the Indians for its fur, which is prized for robes, muffs, and collars.

What animal gives the fur commonly called fitch ?

The polecat, a small animal much like the weasel, found in Europe and Asia. It is dark brown above, and yellowish brown below.

Is not the fur of the common cat also valuable ?

Yes ; it is used for making sleigh robes and rugs, and for lining children's cloaks. In Holland, cats are raised for their fur.

What is the black, glossy fur called Astrakhan ?

The skins of black lambs, brought from Astrakhan, on the Caspian Sea. Many are brought also from Persia, Greece, and Hungary.

What are squirrel skins used for ?

Mostly for women's and children's wear. Squirrel skins are sometimes dyed to look like sable. Artists' brushes are made of the hairs of the tails.

Are there not many colors of squirrels ?

Yes ; there are red, gray, black, and white ones.

Where do buffalo robes come from ?

From the prairies of the West, where hundreds of thousands of buffaloes are killed every year.

Are these animals rightly called buffaloes ?

No, they are really bisons ; there are no buffaloes in America. The only kinds of buffaloes in the world are the Indian buffalo of the East Indies, and the Cape buffalo of South Africa.

What is curled hair, used for stuffing beds and cushions ?

The best curled hair is made from the

shorter parts of the manes and tails of horses; but the hair of cows, and the finer kinds of pigs' hair, are sometimes used for making it.

How is it made?

The hair is twisted into ropes, then soaked in cold water, heated in an oven, and untwisted, when it keeps the curl given it in the rope.

What is hair cloth made of?

The long hair of horses' tails woven; but the weaving is different from that of other cloth on account of the shortness of the hairs, which can be used for the weft or cross-threads only, the warp, or threads which run up and down, being generally of black linen. Each cross thread is made of a single hair, so that the cloth can be made only as wide as the hairs are long.

Is not the hair of other animals also used in weaving?

Yes; in Germany cow hair is spun into yarn and woven into carpets, and in Norway the peasants make socks of it. In some countries, too, the hair of camels, goats, and dogs are used for making cloth.

What is human hair mostly used for?

For making wigs, curls, and chignons, and false beards and moustaches. It is also plaited into ornamental work, such as chains, watch-guards, brooches, and bracelets.

Where does most of the human hair used come from?

From France, Italy, and Germany, where young peasant women sell their hair to men who go round the country to collect it. These sell it to hair merchants, who sell it again to the wig-makers.

Are the antlers of the stag rightly called horns?

No; they are not horn, but bone, and ought not, therefore, to be called horns.

What are the horns most used in manufactures?

Those of the ox, cow, bison, buffalo, sheep, goat, and antelope.

How are they prepared?

The bony core, which most horns have, is got out by soaking them five or six weeks in water. The tips, which are solid, are then sawed off, to be used in making knife handles and buttons. The hollow parts are softened in boiling water, slit open with a knife, spread out flat, and pressed between iron plates.

What are they pressed for?

To make them stay flat; but by pressing them very hard, they can easily be separated into thin plates.

Were not those thin horn plates used in old times for window glass?

Yes; and they are still used sometimes in lanterns instead of glass.

Cannot horn be moulded into any shape when heated?

Yes; and it will keep the shape when it cools. In making knife and fork handles, buttons, and other small things, the pieces are cut of the right size, softened in hot water, and then screwed up in moulds which shape the horn, and press into it any letters or figures which may be on the inside of the moulds.

How are horn combs made?

The plate of horn is softened and the comb is then stamped out with a sharp punch. It is then finished by filing and polishing.

Are not scraps of horn valuable?

Yes; even the parings and scrapings may be softened and pressed into different forms.

What are the bones of animals used for?

They are made into handles for knives and forks, tooth and nail brushes, combs, buttons, and other things.

What is bone ash?

Bones burned in an open fire, and then ground to powder. It is largely used as a manure for land. Bone dust, which is used in the same way, is bones ground but not burned.

What is bone black?

A black, powdered charcoal, made by burning bones in a close vessel called a retort, and then grinding them fine.

Has it not the power of taking all the color out of liquids?

Yes; and it is therefore much used for whitening the syrups of sugar, and for taking the impurities out of water and other liquids.

Will it not also destroy bad smells?

Yes; and is used to purify rooms, clothing, etc.

Is not shoe blacking made of it?

Either of it or of ivory black, which is made of scraps of ivory burned and ground in the same way.

What other things are put into blacking?

Some oil, a little sugar or molasses, some vinegar or sour beer, and a little sulphuric acid. All these things are ground into a paste and then put up in tin boxes; or, made a little thinner, and put into bottles.

Where does ivory come from?

The best ivory is got from the tusks of the elephant, but the teeth of the hippopotamus, walrus, and other animals are sometimes used for ivory.

Does not the African elephant give the best ivory?

Yes; and many thousands of them are killed every year for their tusks alone.

Is not some ivory brought from Siberia?

Yes; it is taken from the bodies of dead elephants found frozen up under snow and

ice in the far north, where they are supposed to have lain for thousands of years.

Where did these elephants come from?

They are supposed to have lived in Siberia when that country was much hotter than it is now.

How many kinds of elephants are now living?

Two kinds; the Asian and the African. The Asian elephant is found mostly in India and in Ceylon, and the African elephant in middle Africa.

What is the difference between them?

The African elephant is larger than the Asian, and has much larger ears.

Which kind do we see in menageries?

The Asian elephant. The African elephant is wilder and fiercer, and is not now tamed, though in ancient times it was used by the Carthaginians in their wars with the Romans.

Are not white elephants sometimes found?

Yes; but they are very rare. In Siam, the white elephant is a sacred animal and is treated with great respect.

How long does the elephant live?

Sometimes a hundred and fifty years, but generally not quite so long.

Are not the tusks of the elephant really teeth?

Yes; they are two long teeth which grow out of the upper jaw, one on each side.

What does the elephant use them for ?

To root up the ground and to tear climbing plants from trees; tame elephants move stones, timber, and other heavy things with them.

What are tame elephants used for ?

They are used in India for dragging heavy things, for travelling, and for tiger hunting.

What are the uses of ivory ?

It is made into knife handles, billiard balls, chessmen, dice, combs, fans, paper knives, organ and pianoforte keys, and other things.

Is it not also carved into toys and ornaments ?

Yes; especially by the Chinese and Japanese, who are very skilful in working it.

Is there not a kind of ivory which grows on a tree ?

Yes; but it is not real ivory, though it looks much like it. It is the nut of a kind of palm tree which grows in South America.

Can it not be used instead of ivory ?

Yes; for many things, such as buttons, umbrella handles, and cane heads.

What are tigers' skins used for ?

They are highly valued for robes, mats, and rugs. In China, the seats of judges are covered with tiger skin.

Where are tigers mostly found ?

Tigers are found only in Asia, and they are more plentiful in India than in any other country.

Are they not very dangerous animals?

Yes; and they are the terror of villages in India, where they carry off yearly many cattle and human beings.

How are they hunted?

Generally by men mounted on elephants, who ride into the thick jungles where the tigers live, and shoot them.

Is it not dangerous sport?

Yes; for a wounded tiger will sometimes spring on to an elephant's back and strike the hunter with its claws before it can be shot again.

Where does the lion live?

In Africa and in Asia, but the Asian lion is not so large nor so fierce as the African lion, and has a smaller mane.

What is the color of the lion?

Generally a tawny yellow. It is always of one color, that is, without stripes or spots, but the mane is darker. Only the male lion has a mane.

Are the skins of any use?

They are used for rugs and robes. In ancient times warriors often had coats of lion skin.

What is the color of leopard skin?

Tawny yellow, beautifully spotted with black.

Is it not much valued ?

Yes; it makes handsome robes and rugs, and it is sometimes used as a saddle cloth by soldiers. In Austria, the royal guard of Hungarian nobles wear mantles of leopard skin.

Where is the leopard found wild ?

In Africa and in India.

Where is the panther found ?

Some think that the panther is only a kind of leopard ; but others say that the panther is larger, stronger, and darker colored. It is said, too, that the panther is found only in Africa.

Are there no panthers in America ?

No; but the jaguar or South American tiger, and the cougar or puma, are sometimes wrongly called panthers.

What is hartshorn ?

A liquid much used in the arts, which was formerly made by distillation from the horns of the hart or stag, from which it was called spirits of hartshorn.

Is it not also called ammonia ?

Yes; and it is now made mostly from the waste tar-water of gas works.

What is the female of the deer called ?

Doe; and the young deer a fawn. The flesh of the deer is called venison.

Are not the elk and the moose kinds of deer?

Yes; but they are both larger than the common deer, the moose being as large as a heavy horse.

What is musk?

A perfume got from the musk-deer, a small animal without horns, which lives in the mountains of central Asia. The musk is a reddish-brown ointment, which grows in a small bag between the hinder legs of the male deer.

Do not other animals smell of musk?

Yes; the musk-ox, musk-rat, and musk-duck smell of it, but none but the musk-deer gives the perfume.

What are the uses of feathers?

For making pens and fans, for stuffing beds, pillows, and cushions, and for ornament.

What kind of feathers are pens made of?

Of the quills from the wings of the goose, but sometimes of those of the swan, crow, turkey, and ostrich. Quill pens are now out of fashion, though some people still use them.

Are not very beautiful fans made of feathers?

Yes; and in some countries splendid feather screens are carried by servants to shade the king. Large fans made of ostrich plumes are borne behind the Pope on great occasions.

Have not robes also been made of feathers ?

The Aztecs or Mexicans made robes of colored feathers, and in the Sandwich Islands a splendid mantle made of many thousand feathers of the rarest birds was for a long time worn by the king when he was crowned.

What has become of this mantle ?

It was buried with the body of one of the late kings.

Do not the people in Arctic countries clothe themselves with feathers ?

Yes; some of them make coats of bird skins, which they wear with the feathers inside.

What feathers are mostly worn for ornament ?

Those of the ostrich are most valued, especially the long white plumes from the back and tail of the male bird; but the feathers of many other birds, such as the peacock, swan, turkey, pheasant, heron, ibis, and many others are worn.

Are not the wings of birds worn by ladies ?

Yes; the wings of many kinds of birds, and sometimes whole birds are used as ornaments for hats.

What kind of feathers do soldiers wear in their hats ?

Ostrich feathers and cocks' feathers.

What kind of feathers are put into beds and pillows ?

Geese feathers are the best for beds, but

duck, turkey, and hen feathers are used for cheap beds.

What is down ?

The fine, soft feathers of birds, especially those on the breasts of water birds, such as the duck, goose, and swan. The best down is got from the eider duck.

Where does the eider duck live ?

In cold countries, especially in the most northern parts of America, and in Norway and Iceland.

Are not these ducks very carefully guarded in Iceland ?

Yes ; it is against the law to kill one there in the breeding season. The birds seem to know that they are safe, and build their nests wherever they can find a good place, on top of walls, on the roofs of houses, and sometimes in the houses.

How do they build their nests ?

They build them of small twigs, laced together with moss and seaweed, and line them with down, which each bird tears from its own breast. The mother buries her eggs in this to keep them warm when she leaves the nest for food.

Do the owners of the ground take this down ?

Yes ; and the bird again strips her breast to cover her eggs. This, also, is taken, and, as the mother has no more, the male bird

strips the down from his own breast and puts it into the nest.

Is this not sometimes taken also ?

Yes, but not often ; the poor bird is generally left then to hatch her young in peace.

What is eider down generally used for ?

To stuff bed-quilts with, and sometimes cushions and pillows, but it is not used to put into beds, as it easily becomes matted down.

What are edible birds' nests ?

The nests of a kind of sea swallow, which lives in the Malay Archipelago. They are built of a sticky substance which the birds gather from seaweed. The Chinese value these nests highly, and use them for making soups.

Where did common fowls first come from ?

It is supposed, from India, or from some of the islands of Asia, where many wild kinds are still found ; but the wild ones are not exactly like any of our tame ones.

Are there not now many different breeds ?

Yes ; besides the common barnyard fowl, which is supposed to be a mixture of many breeds, the principal kinds are the Game, Dorking, Poland, Black Spanish, Chinese, and Malay, Hamburg, and Bantam.

Are not game fowls very quarrelsome ?

Yes ; and on this account they are much *used in cock-fighting.*

Where did the other breeds of fowls first come from ?

Dorking fowls were first raised in the town of Dorking, England ; Polands are supposed to have come from Poland, and Black Spanish fowls from Spain ; Chinese and Malay fowls from China and Malacca ; and Bantams from Bantam in Java.

Is not the turkey an American bird ?

Yes ; it was first found in America, but it is now raised in almost all parts of the world.

Are not wild turkeys still found in our woods ?

Yes ; in the west and south-west parts of the United States, but they are not as plentiful as they used to be.

When were turkeys first carried to Europe ?

In the beginning of the sixteenth century. They were given this name because it was first thought that they came from Turkey.

Where did the tame goose come from ?

The common goose of our poultry yards is supposed to have sprung from the wild goose of Europe, which is a gray bird with a yellow bill.

Are there no wild geese in America ?

There are several kinds. The most common kind is the Canada goose, a dull gray bird, with black head, bill, tail, and legs.

What are Strasburg pies, or "pâtés de foie gras" (French, patties of fat liver) ?

Pies, or patties, made of the fat livers of geese. Geese are shut up in cages so that they cannot move, and fed until they are very fat, when their livers become greatly enlarged. From these livers are made the pies, which are sent from Germany and France all over the world.

Are there not many kinds of ducks ?

Yes; both wild and tame. The common ducks of farmyards are descended from some of the wild kinds.

What is the muscovy duck named from ?

It is so called because it has the smell of musk about it, and ought, therefore, to be named musk duck. Some people wrongly think that it came from Muscovy or Russia, but it was probably first brought from South America.

Are there not many kinds of pigeons ?

Yes; and they are found in almost all parts of the world; but only two kinds, the common pigeon and the turtle-dove, have been tamed.

Are there not many fancy pigeons ?

Yes; but they are all kinds of the common pigeon, whose shape and habits have been changed by long breeding.

What are the principal fancy pigeons ?

Fantails, so called because they spread out their tails like a fan ; tumblers, which get their name from their habit of turning over or tumbling in the air ; pouters, which have a crop which the bird can fill with air until it swells up almost as large as the body ; jacobins, which have a ruff of raised feathers on the back part of the head ; and carrier pigeons, so called because they are used for carrying letters.

Have not carrier pigeons been used for this purpose since the most ancient times ?

Yes, especially in the East ; and the Romans used them to carry messages in and out of towns besieged by an enemy.

How are they taught ?

They are noted for their love of home, and when away will always return to it. When very young they are taken in a covered basket a short distance from their home, and if they return there, they are carried further away, the distance being increased each time until they will go back no matter how far off they may be.

How do they carry the letters ?

The letters are usually written on very thin paper and tied round the upper part of the leg, so as not to hinder the bird from flying.

Do not carrier pigeons fly very fast ?

Yes; at least thirty miles an hour, and some have been known to go twice and even three times as fast.

What is honey ?

The sweet juices of plants collected from flowers by honey bees, and put by them into the cells of honey-comb.

What is virgin honey ?

New honey made by young bees; it is a clear liquid in a white comb. As honey grows old it gets a yellow or reddish color.

Has not honey been an article of food since the most ancient times ?

Yes; but it is not so much used now as it was before sugar was known.

Is not a kind of wine made from honey ?

Yes; it is called honey-wine, or mead.

What is wax made of ?

The wax of the honey bee is made out of the sweet juices of plants, just as honey is. It was once thought that bees gathered wax from plants, but it is now known that they will make wax if they are shut up and fed on sugar alone.

What do bees do with their wax ?

They make honey-comb cells of it to pack their honey in.

How is wax purified for use ?

The honey is pressed out of it, and the

comb is then boiled in water, strained, and bleached.

What are the uses of wax ?

It was once much used for candles, but stearine candles have nearly taken their place, excepting in Roman Catholic churches, where wax is still used. It is mostly used now for making casts and moulds, wax fruit and flowers, and models of parts of the human figure for medical museums.

What is cochineal ?

The dried bodies of the cochineal insect, used as a dye stuff.

Is not this insect very small ?

Yes ; it takes about seventy thousand of them to make a single pound. When dried they look like little shrivelled grains.

What kinds of dyes are made from cochineal ?

Beautiful scarlet and crimson dyes. The artists' colors called carmine and lake are also made from it.

Where is cochineal brought from ?

Mostly from Mexico, where there are large plantations of a kind of cactus called *nopal*, something like the prickly pear, on which the insects feed.

How are they gathered ?

They are scraped off the leaves with a knife or brush, killed with boiling water, and dried.

What are cantharides or Spanish flies ?

A kind of green beetle, about three quarters of an inch long. It is called also the blister beetle, because it is used to make blisters of, to use for blistering the human skin in cases of sickness.

How are the insects made into blisters ?

They are dried, ground to powder, mixed with some ointment or lard, and spread thinly on a piece of leather.

Why are they called Spanish flies ?

Because they were once brought mostly from Spain, where they abound, but we now get them mostly from Sicily and from Astrakhan.

What is silk ?

The thread spun by the silkworm.

What is the silkworm ?

The caterpillar of a kind of moth which feeds on the leaves of the mulberry tree. This moth, which came first from China, has a thick, hairy body, and large white wings marked with dark bands.

What kind of eggs does it lay ?

Each female lays several hundred eggs about as large as mustard seed, and fastens them with a sticky gum on the leaves of the mulberry tree.

Are not the caterpillars born from these eggs ?

Yes ; and are, of course, very small at first,

but they soon begin to feed on the mulberry leaves, and grow very fast.

How long does the silkworm live as a caterpillar?

About six or eight weeks. When full grown it is a worm about three inches long, and of an ashy or cream color.

How does it spin its silk?

Near its head are two little bags, filled with a kind of gum. These bags end in two tubes or pipes, which join together in the under lip and form a single tube, through which the gum is drawn, and spun into silk; each thread of it is thus made up of two threads.

What does it spin silk for?

To make its cocoon, that is, a house for it to change its form in.

Do not almost all insects pass through three stages or forms of life?

Yes; in the first stage or form the insect is a kind of worm or caterpillar, in the second it shuts itself up in a house which it builds, and in which it lies quiet until the time comes for the third form, when it changes into the full insect.

How does the silkworm spin its cocoon?

It first spins a few coarse threads to hang itself by, then folds itself up like a horse-shoe and spins silk all over its body, covering itself entirely.

How long does it live in this way ?

Fifteen or sixteen days, during which time it changes, little by little, into a winged insect. When the right time comes it works its way out of the cocoon, dries itself, and flies away a perfect moth, ready to lay more eggs.

Is the cocoon left by the insect used for making silk ?

Sometimes; but as it does not make as good silk as those which have not been opened, it is usual to kill the worm by steaming the cocoons.

What is then done ?

The cocoons are soaked in hot water to melt the gum, and the silk is then unwound from them. It is of a bright yellow, and is called raw silk.

How much silk is generally got from one cocoon ?

About a thousand feet, but it is so fine that a good many have to be twisted together to make a thread as large as sewing silk.

Where do we get raw silk from ?

Most of that used is brought from China, India, and Japan, but a good deal is made in Italy, France, and Russia.

Where are silk thread and cloth made ?

Principally in France, Italy, the United States, Germany, Great Britain, Switzerland, and Belgium.

When was the art of raising silkworms first known in Europe?

In the time of the Emperor Justinian I., who reigned in Constantinople from A.D. 527 to 565.

Did not the Chinese try to keep the manufacture of silk in their own country?

Yes; they made laws forbidding the people from selling any of the eggs to foreigners. But it is said that two monks, who went to China, got some of the eggs and brought them to Constantinople in hollow canes; and from these few eggs all parts of the Eastern Empire were soon supplied with silkworms.

What is velvet made of?

Of silk, or of silk and cotton mixed. When made of all cotton it is called velveteen.

How is velvet made?

It is woven much like Wilton carpets, over brass wires laid crosswise, thus making little rows of loops. Each wire has a little groove along the top, and in this is run a sharp-edged knife, thus cutting all the loops, so that the threads will stand up. They are then sheared smooth to make the nap.

Is not some velvet left uncut?

Yes, the wires being drawn out so as to leave the loops standing; and striped and plaided velvets are made by cutting some of the loops and leaving others uncut.

What is satin ?

A glossy kind of silk, made by weaving the threads in a different way from plain silk. A thin kind of satin is called satinet.

Is not brocade also made of silk ?

Yes; so woven as to make a beautiful pattern of raised flowers, foliage, and other figures.

Is it not also sometimes woven with gold and silver threads ?

Yes; but not so much as it used to be, because they lose their brightness so easily.

What is brocade mostly used for ?

For making curtains and for covering furniture, but sometimes for ladies' dresses.

Where are ribbons made ?

Mostly in France, Switzerland, England, and Prussia, but fine ones are also made in this country, in Paterson, New Jersey.

What ribbons are considered the best ?

The French and Swiss ribbons, because they are made mostly by hand, those from other countries being made by machinery.

Are ribbons made of all silk ?

The best ones are; but cheap ones have much cotton mixed with the silk, and some ribbons are now made wholly of cotton and then printed in colors.

What is gauze ?

A very light kind of silk or linen, so thin

that one can see through it. A cheap gauze is made of silk and cotton ; and there is also a kind of flannel called gauze flannel.

Where was gauze first brought from ?

From the city of Gaza, in Palestine, and from this it got its name.

What is crape ?

A kind of thin, silk gauze, commonly dyed black, and worn for mourning ; but it sometimes is used white, as a trimming for dresses.

How is it made ?

It is woven out of raw silk, the threads being tightly twisted, and afterward stiffened with gum, which, as it dries, partly untwists the threads and gives the crape its rough or crinkled look.

What is whalebone ?

A horny substance taken from the upper jaw of the Greenland whale. It is not rightly called bone, for it is more like the horns of cattle.

How does whalebone grow in the mouth of the whale ?

In many rows of plates, set closely together and fastened to the roof of the mouth. The edges of these plates as they hang downward form a set of fringes.

What are their uses ?

The whale catches its food with them.

When it swims along it keeps its mouth open and takes in water all the time; the fish and other small animals that go in are swallowed, and the water is spouted out again through its blow-holes or nostrils.

Has the whale no teeth?

The Greenland, or right whale, as it is commonly called, has none, but the sperm whale has large, sharp teeth in its lower jaw. These are used for ivory, but they are not so good as elephant ivory.

What are the uses of whalebone?

When softened by boiling, it can be cut up into bristles for brushes, ribs for umbrellas and parasols, stiffeners for corsets, handles for whips and canes, and coverings for telescopes and opera glasses. Fine strips of it are also plaited into hats and bonnets, and woven into hair cloth.

Where does whale oil come from?

Most of it is made by boiling the blubber or fat of the Greenland whale; but sperm oil is got from the sperm whale.

What else is found in the sperm whale?

Spermaceti and ambergris.

Is not spermaceti taken from the head of the whale?

Yes; the sperm whale has a large hollow in its head, filled with liquid spermaceti and oil. To get this a hole is cut in the top of

the head, and the mixture taken out with buckets. The spermaceti is then separated from the oil by boiling. When it cools, it is a white substance something like wax.

What is ambergris ?

A gray, fatty substance, used as a perfume, found in the intestines of the sperm whale.

Is it not sometimes found floating in the sea ?

Yes; and is also sometimes picked up on the beach. It is thought to be made by the indigestion of a part of the whale's food.

Is it not very costly ?

Yes; it is worth about five dollars an ounce. When mixed with alcohol it makes a very delicate perfume.

What is tortoise shell ?

It was once thought to be the shell of the tortoise, and this is the reason why it was given this name; but it is now known to be the shell of a kind of turtle called the hawk's-bill turtle, because its jaws are hooked like those of a hawk.

How does the shell grow ?

In plates, which lap over each other like tiles. The finest ones, marked with reddish brown and golden-yellow shades, grow on the back; those on the belly are plain yellow.

Is not tortoise shell easily softened ?

Yes; by putting it into boiling water. It

may then be moulded or pressed into any shape, which will keep after cooling.

Cannot pieces also be joined together ?

Yes; by scraping the edges down thin, warming them, and pressing them together tightly in a press. Pieces of mother-of-pearl, silver, gold, etc., may be inlaid in tortoise shell by laying them on the shell when softened, by warming and forcing them into it by means of a press.

What is tortoise shell used for ?

For making boxes, card cases, combs, the rims of eyeglasses, and many kinds of ornaments.

Where is the best tortoise shell brought from ?

From Singapore and Canton.

What is the difference between turtles and tortoises ?

Turtles live in the sea, while tortoises live mostly on land, though sometimes in marshes and rivers.

From what turtle is turtle soup made ?

Mostly from the green turtle, which is brought from the West Indies. It is so called from its green fat.

Are there not many kinds of tortoises in the United States ?

Yes; among them are the box tortoise, the gopher tortoise, the mud tortoise, the snapping turtle, and the terrapin. There are several kinds of terrapins which are much *prized for food.*

What is mother-of-pearl?

The silvery substance with which the inside of many shells is lined. Most of it is got from the shells of the pearl oyster.

Are not these shells brought from the East Indies?

Yes; but many come also from South America and from the Pacific islands.

What is mother-of-pearl used for?

For making knife handles, shirt buttons and studs, and ornaments. Furniture is also inlaid with it, and papier-maché is ornamented with it.

How is it manufactured?

The shells are sawed up into the right sizes and shapes, and the pieces are then ground on grindstones and polished.

What are pearls?

Round substances found within the shells of the pearl oyster or some other shell fish, and used as jewels.

Are not pearls made up of the same substance as mother-of-pearl?

Yes; the mother-of-pearl is made from a kind of juice which the oyster spreads round to form its shell; and it is thought that when some hard substance, like a grain of sand, gets into the shell, some of the mother-of-pearl collects on it and thus makes a round pearl.

Are not several pearls sometimes found in one shell ?

Yes; often as many as ten or twelve of different sizes, some of which are fastened to the shell and some are loose in the flesh of the oyster.

Do not the Chinese force oysters to make pearls ?

Yes; by putting small beads into the shells of live oysters, and then putting the oysters back again into the sea, where they soon cover the beads and make them into large pearls. They also put in little metal images of their gods, which are thus changed into pearl ones.

Where are the best pearls found ?

Off the coast of Ceylon and in the Persian Gulf, where the pearl oysters grow in beds much like those of the common oyster.

How are they brought up from the bottom ?

They are brought up by men called divers, who are let down by a rope from a boat, and who stay sometimes two minutes under water. They cut off the oysters from the rocks, put them in a basket or a net, and then give a signal and are hauled up into the boat again.

How are the pearls got out of the oysters ?

The oysters are carried ashore and piled up in the hot sun and left until they have rotted and dried. They are then opened

and washed with sea-water in a trough, when the pearls are easily found.

Are not the pearls found of different sizes ?

Yes; and they are divided into three classes by sifting them through copper sieves with different sized holes. The smallest pearls, which are called seed pearls, are sold by measure, but the larger ones by number.

Are all pearls white ?

No ; some are yellowish and some are rose-tinted.

Are there not also pink pearls ?

Yes; but they are got from conch shells, which are found mostly in the West Indies and Panama. These are more valuable than white pearls, because they are more rare.

Is there not a still more rare and costly kind ?

Yes; black pearls, which are found in different kinds of shells, but they are very scarce.

What are Roman pearls ?

False pearls, made of hollow glass beads, coated on the inside with a liquid called essence of pearl, made from the scales of a little fish found only in the Tiber. When dry, the beads are filled with wax, which makes them less apt to break.

Are not false pearls also made in Paris ?

Yes; in nearly the same way as Roman

pearls ; and they are so perfect that they can scarcely be told from real ones.

What is coral ?

The bony frame of the coral animal, which is rightly called a polyp.

Is this frame made by the polyp ?

No ; it is not made by the labor of the animal, as was once thought, but is a growth caused by the food which it takes in, just as the skeleton is in land animals.

Do coral animals move around ?

No ; they are fixed tight to the bottom of the sea, and never move away from the place where they were born. The food which they take in goes to build up the coral under them, and it rises higher and higher until they reach the top of the water, when they die, for they cannot live out of water.

Are not great islands and reefs built up in this way from the bottom of the ocean ?

Yes ; for there are countless millions of these little animals doing this all the time. In the Pacific Ocean there are reefs hundreds of miles long made wholly of coral.

Do all coral animals build alike ?

No ; some form trunks and branches like trees, some round masses marked with stars, and some great vases filled with forms like flowers. Other corals grow like a cabbage,

or in the shape of mushrooms, mosses, and ferns.

Are there not also many colors of coral?

Yes; it is found from the deepest black through different shades of red and yellow to pure white.

What kinds are mostly used for jewelry?

Red coral from the Red Sea and from the African coast of the Mediterranean, and pink coral from off the coast of Italy. Yellow coral from the coast of Sardinia, and black coral from the Red Sea are also used.

Where is coral jewelry mostly made?

In Naples, Italy; and in Marseilles, France.

How is coral got from the bottom of the sea?

In some places men dive down and gather it by hand, but generally a drag is used. It is let down from a boat, which is slowly rowed along over the places where the coral grows. The drag breaks off pieces and they are caught in a net fastened to it and drawn up.

Do not sponges also grow on the bottom of the sea?

Yes; fastened tight to rocks, to which they are fixed by a kind of root, some in deep and some in shallow water.

Do they differ much in size and form?

Yes; they grow in pieces generally from the size of an egg to that of a man's head,

some being pear-shaped, some cup-shaped, and some having many branches.

Do they grow in both cold and hot climates ?

Yes; but those in cold climates are commonly small, while in hot countries they grow very large and plentiful.

What do sponges look like when they are taken from the water ?

They are dark-colored, and look like beef liver. They are made up of a framework, which is really the skeleton of the sponge, and of a jelly-like substance which covers the framework all over when the sponge is alive.

How is this jelly got out of sponges ?

They are buried in the sand until it decays, and then put into cages and left in the sea to be washed.

Where do the best sponges come from ?

From the Greek Archipelago and the coast of Syria; but the sponge fishery is also carried on off the coast of Barbary, in the Red Sea, and in the West Indies.

How are the sponges got ?

They are cut from the rocks on which they grow, by men who are let down to the bottom of the sea from boats. Some are torn from the rocks with three-pronged forks, from the boats, but these are not so good as those brought up by divers.

Why are sponges so valuable for cleaning purposes ?

Because they will take up much water into their tubes and hold it until it is squeezed out.

How long have oysters been eaten ?

From the most ancient times, and they have been used as food by almost all peoples.

Were not the Romans great lovers of them ?

Yes; and they were the first to make oyster ponds, in which they were raised, and fattened for the table.

Are all oysters alike ?

No; there are said to be more than fifty kinds in different parts of the world. Those growing in cool climates are much better than those of hot countries.

Where are oysters mostly found ?

In rocky beds, near shores, in water twelve to fifty feet deep, and generally in quiet bays or in the mouths of rivers.

Can oysters live in fresh water ?

No; but they sometimes live a long time out of water, as they take up a good deal in their shells.

How long does it take an oyster to grow ?

About three years, and some do not become full grown before their fifth or sixth year.

Are there not two kinds of clams ?

Yes; hard or round clams, and soft or long clams.

Is not the round clam sometimes called quahaug?

Yes; that is the Indian name. The Indians used to prize this clam highly, because their *wampum*, which they used for money, was made out of its shells.

Where are clams found?

Round clams are commonly found buried in soft mud along the sea shore, a little below the surface, where they can easily be raked out; but long clams lie in beds of mud or sandy gravel about a foot deep, and have to be dug up with a hoe.

What are clams used for?

They are largely used for food and as bait for fishing. Great numbers of them are salted in barrels every year to be carried to Newfoundland for bait for the cod and had-dock fisheries.

Is not the mussel something like the clam?

Yes; but it is smaller and has a nearly three-cornered shell, which is greenish-black on the outside and purplish-white inside.

Are there not both salt-water and fresh-water mussels?

Yes; but they are not exactly alike. Fresh-water mussels are used for fish-bait, but they are seldom eaten.

Have not pearls been found in fresh-water mussels?

Yes; some very fine ones were once found in mussels in a brook in New Jersey, and this

set many people looking for pearls, and much time was thus wasted which might have been better spent.

Are salt-water mussels eaten in this country?

Sometimes; but in Europe, where oysters are not so plentiful as here, they are an important food, and are called the poor man's oyster.

Are they not raised much as oysters are here?

Yes; on the Atlantic coast of France are vast beds of mussels, and thousands of people are employed in gathering them for market. The mud-flats where they grow are covered with rows of tall posts twisted full of wicker-work, and on these, which are covered with water when the tide comes in, the mussels fasten themselves and grow.

Do not some mussels have a kind of silky beard?

Yes; they have a little bag at the end of a part called the foot, which gives out a fluid which thickens so that it may be drawn into a fine thread. Many threads are thus made until a bunch or beard is formed, by which the mussel can anchor itself so tightly to a rock that it cannot be pulled off without breaking it.

What is sometimes done with this beard?

In Sicily a soft kind of silky cloth is sometimes made of it, and in some places in Italy

it is mixed with about a third of real silk and made into gloves and stockings.

What is the scallop ?

A kind of shell-fish, having a nearly round, ribbed shell with scalloped edges. It is found along the coasts of New England, New York, and New Jersey, and is much used for food.

What are the shells used for ?

For covering the sides of pincushions, and for ornamenting frames and boxes.

Are there not many scallops on the coast of Palestine ?

Yes; and in old times pilgrims returning from the Holy Land used to wear them to show that they had been there.

What is sepia ?

A water-color paint made from the ink of the cuttle fish.

What is the cuttle fish ?

A singular kind of fish found in the waters of almost all parts of the world. It has ten arms or legs growing out round the head, two of which are longer than the others; and the hinder part of the body is fitted with a light, soft bone, full of little holes.

What is the use of this bone ?

It is not known exactly, but as the fish generally swims backward, some think it is to keep it from getting hurt by striking *against* things.

Is not this the bone which we often see in bird cages?

Yes; birds love to whet their beaks on it, and they also get from it the lime needed for the growth of their bones.

What is the ink of the cuttle fish?

A black fluid which it carries in a bag, and which it can squirt out to darken the water when an enemy is near, so as to give it a chance to escape.

Was not the beautiful dye called Tyrian purple, so much prized by the ancients, got from a shell fish?

Yes; from a small shell-fish called the murex, but little larger than a snail. This dye, which was of a deep violet shade, was used only for coloring the mantles of princes and nobles.

What are shell cameos?

Cameos carved out of shell instead of stone. The principal shell used is the helmet shell, which has layers of black and white. The white part is carved into the form wanted by means of fine steel tools, great care being taken not to cut into the black layer which is left for a background.

What are shell cameos used for?

For setting in rings, earrings, brooches, bracelets, and other ornaments.

Is not the pink conch shell sometimes made into jewelry?

Yes; it is carved into beautiful forms and

looks much like pink coral, but it is not so costly.

Are not shells sometimes used for making roads?

Yes; common shells such as oyster and clam shells are often put on roads, where they soon become broken up and packed hard and smooth. Shells are also burned into lime and are ground up and put on land to enrich it.

What is isinglass?

A pure kind of gelatine. The best is made from the air-bladders or sounds of sturgeons caught in the Black and the Caspian Seas; but some is made from the bladders of cod and other fish.

Does it not make a clear, beautiful jelly?

Yes; and it is much used for making blanc mange, ices, and other kinds of desserts. A poor kind is used for fining or clarifying beer.

Is not court plaster made with it?

Yes; by spreading a coating of it on silk. When spread on muslin or linen instead of silk it is called isinglass plaster.

What is caviare?

The roes of sturgeon, washed with vinegar, salted, dried, and pressed into cakes. The best is made from the roes of the sterlet, or *small kind of sturgeon*.

Where are codfish mostly caught?

Those eaten in the United States, and most of those used in France and England are caught on the Grand Bank of Newfoundland; but there are also very important fisheries off the coasts of Norway, Iceland, Holland, Scotland, and the Pacific coast of the United States.

How are the fish cured?

They are cleaned, split open, and salted, and packed away in the hold of the vessel. When the vessel gets home the fish are taken out, washed, and dried in the sun.

In cleaning codfish what is done with the inner parts?

Most of them are thrown overboard, but the livers, the sounds or air bladders, and the tongues are saved. The sounds and the tongues are salted in barrels for food, and the livers are pressed to get out the oil, commonly called cod-liver oil, which is used for medicine.

Is not the herring a very valuable fish?

Yes; and the herring fishery is more important than any other, excepting the cod.

Is it not also very plentiful?

Yes; great shoals of herrings appear almost every spring, summer, and autumn, on the shores of Europe, Asia, and America, going off into deep water in the winter.

Where are the principal fisheries in America?

Off the coasts of Maine, Newfoundland, and Labrador.

How are the herrings caught?

In nets, sometimes a mile long, which reach down in the water about five times the height of a man. The herrings try to get through the holes in the nets, and are caught and held tight by the gills.

What is then done with them?

The nets are hauled in, and when the boats are filled the fish are taken to the shore, where they are cleaned, salted, and packed in barrels.

What are herrings thus cured called?

White herrings; when salted and smoked they are called red herrings; and those which are smoked only a little, and are meant to be eaten at once, are called bloaters.

What are sardines?

The young of a fish of the same family with the herring. When it grows up, it is called the pilchard.

Where are sardines mostly found?

In the Mediterranean, the north Atlantic, and the Baltic. A large part of those sold are caught off the coast of Brittany, in France.

How are they caught?

In the same way as herrings. When the

boats are filled the fish are taken ashore, where they are washed, scraped, and salted, their heads and gills cut off, and then washed again and dried in the sun on frames.

Is this all the curing they have ?

No; when dry they are cooked in great kettles of boiling oil for two hours, and dried again; they are then packed in tin boxes by women, who pour boiling oil over them, fit on the lids, and seal them up tight.

Are not other small fishes sometimes sold for sardines ?

Yes; a large part of those sent to the United States are not sardines, but sprats, shiners, roach, and dace.

What is the American sardine ?

The young of a fish called the menhaden. Many of these are caught on the coast of New Jersey, put up in oil, and sold for real sardines.

What was the sardine named from ?

From Sardinia, off the shores of which many are caught.

What is the anchovy ?

A small fish caught in the Mediterranean, mostly in the months of May, June, and July.

Does it not belong to the same family with the herring ?

Yes, and it looks much like the herring, but is not more than three inches long.

How is it caught?

The fishermen go out in the night, carrying torches in their boats. The fish see the light and swim up to the boats in such numbers that they are easily scooped up with nets.

How are they made ready for market?

They are cleaned and packed in salt and water in small barrels, and sent to other countries, where they are usually taken out and put into bottles.

How are anchovies eaten?

They are sometimes eaten raw as a relish, and sometimes made into sauce.

How long has anchovy sauce been used?

Since the time of the ancient Romans, who called it *garum*.

Does not the shad also belong to the same family of fishes with the herring, sardine, and anchovy?

Yes; but the shad is generally larger, a single one sometimes weighing five or six pounds.

Is the shad a salt-water fish?

Yes; but it goes up rivers to spawn, that is, to lay its eggs.

How are shad caught?

In nets, mostly placed at the mouths of rivers, as their flavor is better when they are taken near the salt water.

Where do those sold in the New York markets mostly come from?

From the Delaware and the Hudson Rivers,

but some fine ones are brought from the Connecticut River.

Where are salmon mostly found?

In the northern parts of North America, Europe, and Asia; but there are none in South America or in Africa.

Are they a fresh-water fish?

They live both in the ocean and in fresh water. In the spring and early summer they usually go up rivers and spawn in shallow streams.

Can they not swim very fast?

Yes, even against a strong current; and they will often jump up dams and waterfalls nearly twice as high as a man.

Do not the young fish live in fresh water?

Yes; they stay in the rivers about a year, and then go down to the sea.

Is not the flesh of the salmon much valued for food?

Yes; it is reddish-yellow and of a fine flavor. In England it is a great delicacy and so costly that it can be enjoyed only by the rich.

Has it always been scarce there?

No, salmon were once so plentiful in the rivers of the north of England that this fish was the cheapest of foods; and it is said that workmen were fed on it so much that they became sick of it, and it was a common thing

for men, when hiring out, to bargain that they should have salmon to eat only three days in the week.

Where do the salmon sold in our markets mostly come from ?

From Maine and Canada. Pickled and canned salmon are brought mostly from the Pacific coast, especially from the Columbia River, in Oregon, where great numbers of the fish are caught every year.

Are not young salmon now being put into rivers where they have become scarce ?

Yes ; the eggs are collected and hatched in buildings made for the purpose, and the young are then put into the rivers, where they grow into large fish.

Is not the mackerel fishery also very important ?

Yes ; and great numbers are caught every year and salted in barrels for food.

Where are mackerel found ?

In all northern seas. Mackerel live all the time in salt water. They come to the coasts in spring and summer to spawn, and go back into deep water when winter comes.

How are mackerel caught ?

Mostly in long nets called seines, by which great numbers of the fish are surrounded and drawn up to the boat, when they are scooped out by small hand-nets.

Are not mackerel caught with hook and line also ?

Yes; the seine can be used only in calm weather; when the wind is high, they are fished for with hooks and lines.

How many kinds of lobsters are caught in the United States ?

Only one kind, which is different from that caught in Europe.

Where are lobsters mostly found ?

Along the Atlantic coast north of New York, from spring until autumn, when they go off into deep water to pass the winter.

How are they caught ?

In long, round traps called pots, so made that one can crawl in but cannot get out again. The pots are baited with dead fish or meat and sunk in deep water, their place being marked by a wooden float fastened by a rope to the pot.

How are the lobsters got out ?

The pots are drawn up usually every day, the lobsters taken out, and then set again to catch more.

Are not the claws of the lobsters fastened so that they cannot bite ?

Yes; by driving a small wooden plug into the joint of the large claw of each one, which prevents it from being opened.

What is the color of the lobster when alive ?

Dark green; but when boiled its shell turns bright red.

Are there not many kinds of crabs?

Yes; some live in salt water, some in fresh water, and some mostly on land.

Where do the common crabs which are sold in our markets live?

In salt water, commonly along rocky shores, but they are also found in deep water.

Does not the crab cast off its shell every year?

Yes; the shell never grows any, and as the crab gets larger its shell becomes too small for it, and it has to have a new one.

What does the crab do when the time comes for its old shell to come off?

It crawls away into some lonely place to wait for its new shell to grow. As the new shell hardens slowly, crabs are in much danger at this time of being eaten by fishes.

Are they not often caught and sold for food while the shell is growing?

Yes; for soft-shell crabs are much better eating than hard-shell ones.

What are the little crabs often found in oysters?

They are another kind called the oyster-crab, which makes its home inside the shell of the oyster, and raises its young there.

Are there not many kinds of eels?

Yes; there are about fifty kinds in different parts of the world, and they are found in almost all climates excepting the very cold ones. They live in both salt and fresh water, usually on soft, muddy bottoms.

Do they go off into deep water in the winter, like many other fishes?

No; they bury themselves about a foot deep in the mud, and lie in a numb state without food until spring.

Is there not an eel which lives in the sand?

Yes; it is called the sand eel. It can dart into the sand head foremost, and bury itself very quickly.

Are not these eels much eaten by other fish?

Yes; they make the principal food of some large fishes; and on the Banks of Newfoundland they are used as bait for catching cod-fish.

What is the electrical eel?

An eel found in rivers and ponds in the north parts of South America, which has the power of giving an electrical shock strong enough to knock a man down.

Of what use is this to the fish?

It defends itself with it against its enemies, and kills its prey with it.

How do the Indians catch these eels?

They drive wild horses into the pool where they are, and after the eels have used up their electricity on the horses, they take them without fear. It is said that some of the horses are usually killed by the shocks.

What are leeches?

A kind of worms living in fresh water,

where they feed on common earthworms, and small water animals.

What are their uses ?

One kind is much used by physicians to draw blood from sick people, which they do without giving pain.

How do they do this ?

They have a sucker in front, by which they fasten themselves to the skin ; they then pierce the skin with their three sharp teeth and suck until they are full of blood, when they let go.

Where do the best leeches come from ?

From the south of Europe.

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By JOHN D. CHAMPLIN, Jr. 16mo.

This little book is arranged on a somewhat novel plan. Its titles, instead of being put in alphabetic form, are classified into the three general divisions of the Mineral, Vegetable, and Animal Kingdoms, and the subjects belonging to these several divisions are treated in course as suggested by one another; thus, common salt naturally suggests other salts, such as nitre, alum, etc., and nitre leads to gunpowder and sulphur. The topics are arranged in the form of questions and answers. The questions are not in all cases mere titles to the subjects, but are often suggestive, and sometimes convey nearly as much information as the answer. By following this plan the writer has been enabled to make the work much more comprehensive than it would otherwise have been.

The publishers confidently offer this little work for the consideration of those interested in educational matters, in the firm belief that its use as a text-book in schools will enlarge the scope of children's ideas by making them acquainted with many subjects of which ordinary school-books do not treat; and that its introduction in the family circle will prove of benefit to both parents and children.





